Rock Products

and CEMENT and ENGINEERING NEWS (Est. 1896)

THE OLDEST PUBLICATION IN ITS FIELD AND THE RECOGNIZED AUTHORITY

Announcing the 1936 Way

TO WIDEN YOUR MARGINS BETWEEN DELIVERED COST AND SELLING PRICE OF READY-MIXED CONCRETE

The way to secure better profit margin in this modern profitable way of selling cement and aggregate is to mix and deliver Ready-Mixed Concrete in the new 1936 Rex Moto-Mixers.

Improved mixing action in the Rex Modern Cone-End Drum *means* better concrete.

The new two-speed drum drive insures the quality of the concrete.

New lighter weight by use of better steels means lower transportation costs.

New, smoother, streamlined design means a better advertisement for your business on the street.

Investigate this new line of Rex Moto-Mixers for greater profit in the ready-mixed business. In 1936, trucks and mixers can't mix and haul cement and aggregate to the job in competition with 1936 Rex Moto-Mixers. In 1936, obsolete truck mixers can't compete with Rex Modern Cone-End Drum Moto-Mixers. Complete information on request—and we want to have our representative call. Write today to

CHAIN BELT COMPANY

1649 West Bruce Street MILWAUKEE, WISCONSIN

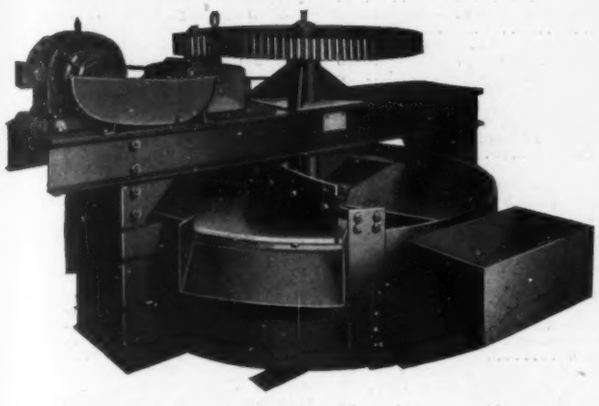
REX READY-MIXED CONCRETE

REX Moto-Mixers

Sand

THAT MEETS THE NEWER SPECIFICATIONS --PRODUCED WITH THE

Rotoscoop



THE trend is towards cleaner, more uniform sand, of greater fineness—some specifications being written today, require from 10 to 25% of-50 mesh, and 2 to 15% of-100 mesh sand.

The Link-Belt Rotoscoop provides a simple method of recovering fine grains formerly lost in the overflow water —discharging dry enough for truck transportation.

The volume of fines and grading can be easily varied to suit requirements.

The Rotoscoop is a self-contained unit requiring low headroom, and minimum space and foundations; also little power. Can be fitted-in to take the overflow from present sand units, or to replace them. Send for Folder No. 1463.

5472

LINK-BELT COMPANY

The Leading Manufacturer
of Equipment for Handling Materials and Transmitting Power

CHICAGO PHILADELPHIA INDIANAPOLIS
ATLANTA SAN FRANCISCO TORONTO

Offices in Principal Cities

The Rotoscoop is made in four sizes: 15 ft., 12 ft., 9 ft., and 6 ft. diameters, with capacities ranging from 20 to 150 tons an hour, based on material weighing 100 lbs. per cu. ft.

Link-Belt makes a complete line of sand dewatering devices, including screw and log washers, conical separators, dewatering flight conveyors, and the Shaw classifier. Link-Belt engineers will be glad to look into your operating conditions and recommend the right unit for your work.

•

The illustration to the right is of a 15 ft. diam. Link-Belt Dewatering Rotoscoop handling crushed limestone sand at Norris Dam (T.V.A.), Norris, Tenn.

Another user has recently written, "We are proud of the Rotoscoop; our sand has been running 18% passing a-50 mesh screen — we figured the deposit would run from 12 to 15% passing."

LINK-BELT

Recognized the World Over as the Leader in Its Field

Rock Products

With which is Incorporated **CEMENT and ENGINEERING NEWS** Founded 1896

Entered as second-class matter, Jan. 20, 1936, at the Chicago, Ill., postoffice under the Act of March 3, 1879.

(Published Monthly)

March, 1936

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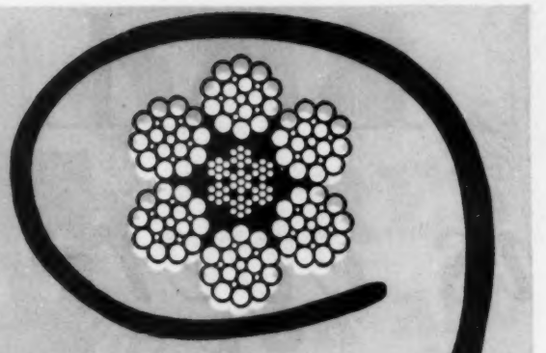
FOR DIGGING LINES



this specially designed excavator rope . . .

6 x 16FB Lang Lay IWRC
MONARCH
WHYTE STRAND
PREFORMED
and Internally Lubricated

TOUGH WIRE. Large outside wires are specially processed to give maximum wear under severe fatigue and abrasion conditions.

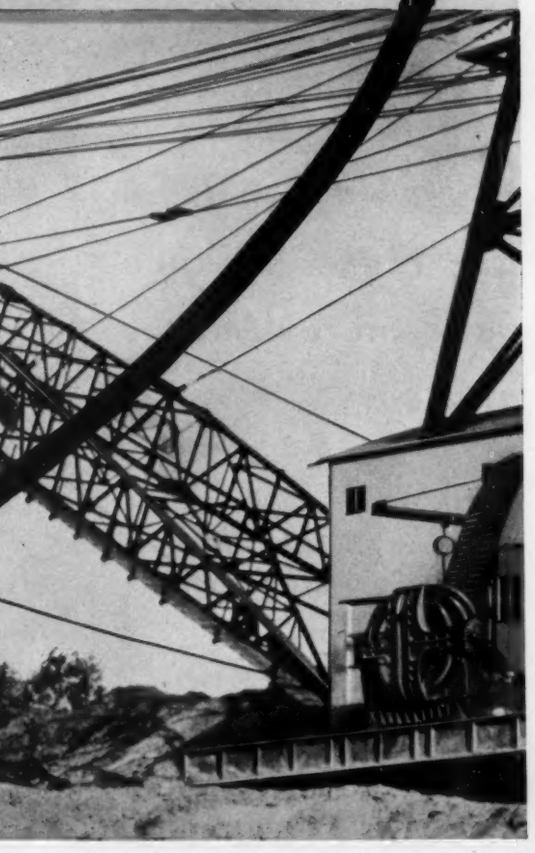
LANG LAY. Wires are laid together to give maximum wearing surface per wire.

INDEPENDENT WIRE ROPE CENTER. Adds strength and resists deformation under heavy loads.

PREFORMED. Wires and strands are helically pre-shaped so they lie naturally in place. Internal stress and friction are reduced to the minimum. Flexibility is increased with resulting increase in service.

INTERNALLY LUBRICATED. Strands of the entire rope are packed with special lubricant during manufacture. Climatic temperatures do not change viscosity of this lubricant which resists water and ordinary acids.

● 8x16FB Lang Lay IWRC Monarch Whyte Strand PREFORMED is only one of the many specially designed Macwhyte ropes made to give maximum service. Let us furnish a specially designed rope for your equipment from our nearest warehouse or distributor stock.



AD NO. 197

Macwhyte specially designed ropes include ropes for shovels, cranes, draglines, excavators, scrapers, loaders, mixers, pavers, drills and incline hoists. Distributors throughout the U.S.A.

MACWHYTE wire rope

MAIL COUPON • Macwhyte Company
Dept. RP-3, Kenosha, Wisconsin • Gentlemen: Please send me the location of your nearest stock.

*Name*_____

*Company*_____

*Address*_____

*City*_____ *State*_____

BALANCE

is everything here!

These products will help you keep the right balance between estimates and cost

FOR balancing actual *costs* against original *estimates*... for keeping machines on balanced schedules . . . lubrication may be a vital factor.

You can trust Texaco Lubricants to give your machinery real protection against lay-ups.

For your Diesels, Texaco Alcaid, Algol and Ursa Oils are refined especially for this service. Newly developed Texaco processes give them unusual purity and toughness — hence a greater capacity to withstand pressures and temperatures.

What little carbon is formed by *these* oils is soft and fluffy. It readily blows away.

Many oils leave gums and hard carbon which clog piston rings, cause undue wear and shut-downs for cleaning. Such oils are expensive at any price.

Your Diesels will operate most efficiently with Texaco Ursa or other Texaco Diesel Lubricants. These products reduce wear and power losses, lower maintenance costs, and cut down unnecessary idle time. They will help you protect your profit margin.

These great Diesel-electric drag lines on one of the toughest construction jobs in the West are lubricated exclusively with Texaco Ursa. The contractors have proved the outstanding superiority of Texaco performance. Texaco Lubricants are used on all their jobs wherever they may be.

Write to The Texas Company and we will send our representative to serve you.

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135 East 42nd St., New York City
Nation-wide distribution facilities assure prompt delivery

TEXACO *Industrial Lubricants*

Firestone
GROUND GRIP TIRES
—Greatest Traction FOR ALL CONSTRUCTION JOBS!

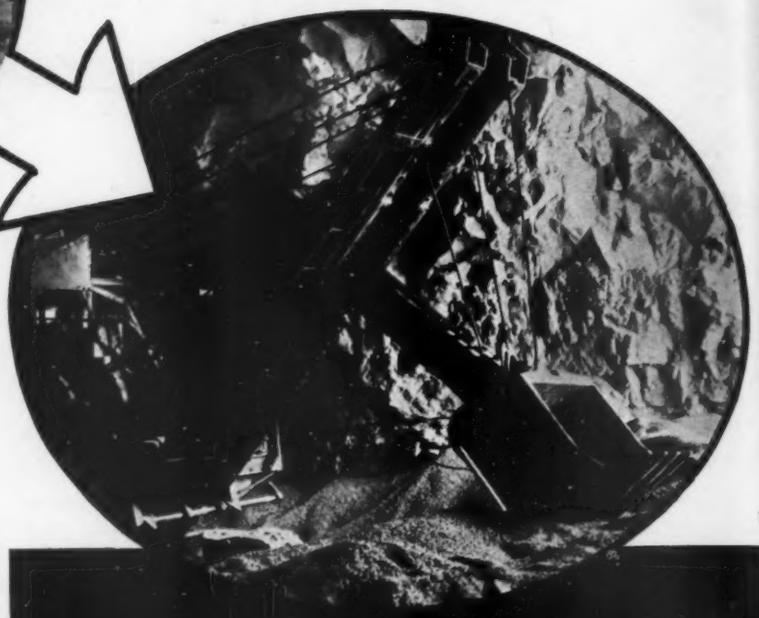
● Firestone Ground Grip Tires haul heavy loads through the toughest going! These massive tires, with the patented super-traction tread, pull right through sand, mud, loose gravel, snow — without chains. They speed up work — cut operating cost.

To gain tremendous strength to withstand such heavy construction work these tires are built with patented Gum-Dipped High Stretch Cords — and two extra layers of these cords lock the tread permanently to the body of the tire.

Save time, money, trouble — equip with Firestone Gum-Dipped Tires. The nearby Firestone Auto Supply and Service Store or Firestone Tire Dealer is ready to serve you.

Listen to the Voice of Firestone featuring Richard Crooks or Nelson Eddy—with Margaret Speaks, Monday evenings over Nationwide N. B. C.—WEAF Network

Tested and Approved for HEAVY DUTY



T-14

Only when wire comes within the narrow tolerance of our rigid specifications, is it permitted to go into any Broderick & Bascom Wire Rope.

The qualifications for use in Yellow Strand are particularly high because this celebrated rope is intended for duty where conditions are unusually severe.

"Flex-Set" Preformed Yellow Strand is made of this same high quality wire.

The difference is this: each strand is pre-shaped to the helical form it will maintain in the finished rope.

Result: a rope that is virtually pre-broken in, flexible, easy to handle and install, with little tendency to kink or fatigue.

For long, satisfactory, economical service, use "Flex-Set" Preformed Yellow Strand.

"Flex-Set" Preformed YELLOW STRAND

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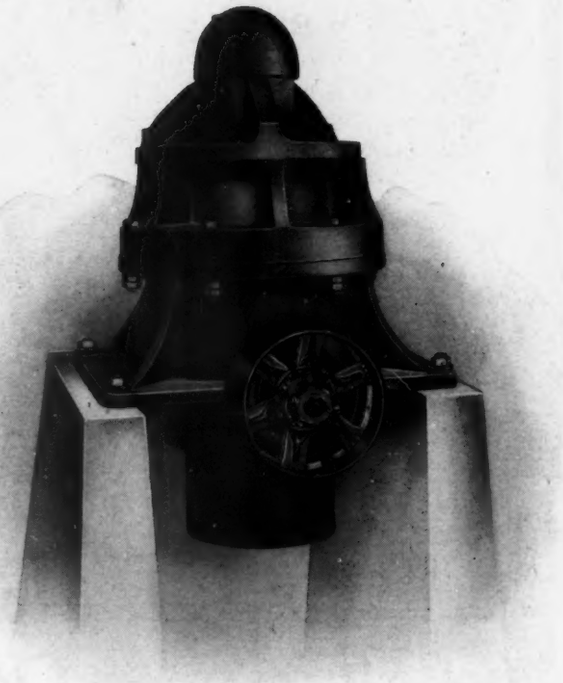
TRAYLOR TYPE TY REDUCTION CRUSHER



A winner, not by our claim, but on the say-so of scores of highly pleased users who have taken the trouble to write us, voluntarily. Which is something that we feel very good about, because a really satisfied operator is pretty much of a rara avis.

Built with cast steel frame; spider, hopper and top shell in one piece; roller bearings; Traylor Original, Patented Bell Heads and Curved Concaves; positive and automatic lubrication; all-around bottom discharge—the TY is the simplest, strongest, most economical crusher you can buy.

You need this crusher to keep pace with the other fellow—you'll LOSE if you don't USE Traylor—so be sure to send for our brand new Bulletin No. 112, now, today!

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THE TIGER *puts his Foot Down on Excessive Costs!*

THE TIGER trade mark for genuine American Tiger Brand wire rope tells a story of savings that extend over maximum periods... performance proved in service . . . quality developed for your specific needs.

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ELECTRICAL WIRES & CABLES

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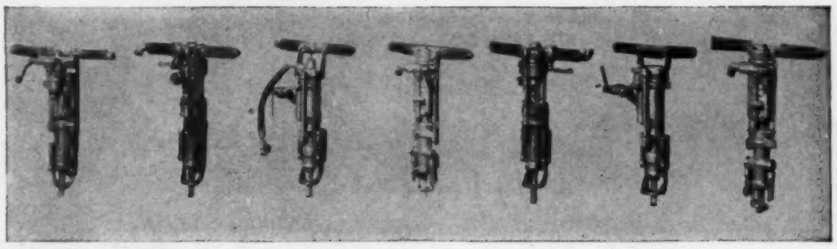
Whatever the Drilling Job

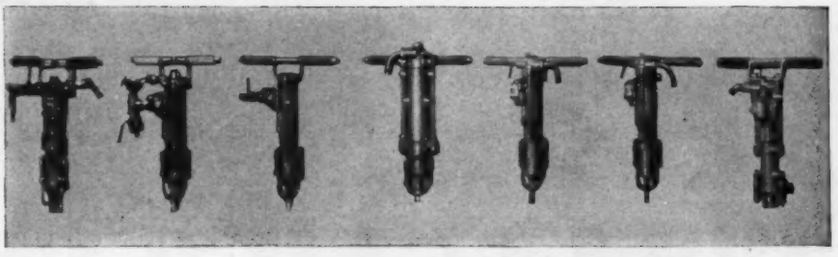
There's a CLEVELAND that will Do It Better!

Cleveland Drills of each type and size are fast cutters, easy to handle, smooth in operation, and—they habitually use less air. Whether your job is primary or secondary drilling—or both—there's always a Cleveland that will save you money on drilling costs.

The Cleveland Line is complete. There are 14 sizes and types of hand hammer drills—5 sizes of drifters, or tripod drills, and the WD and DR Types of drill rigs—all suitable to one kind or another of quarry operation.

Give us a tough drilling job—we'll show you how the right Cleveland Drill will save you money. Our new catalog is for the asking. Did you get a copy of the revised Handbook? Yours is here for you—just fill in the coupon and mail.

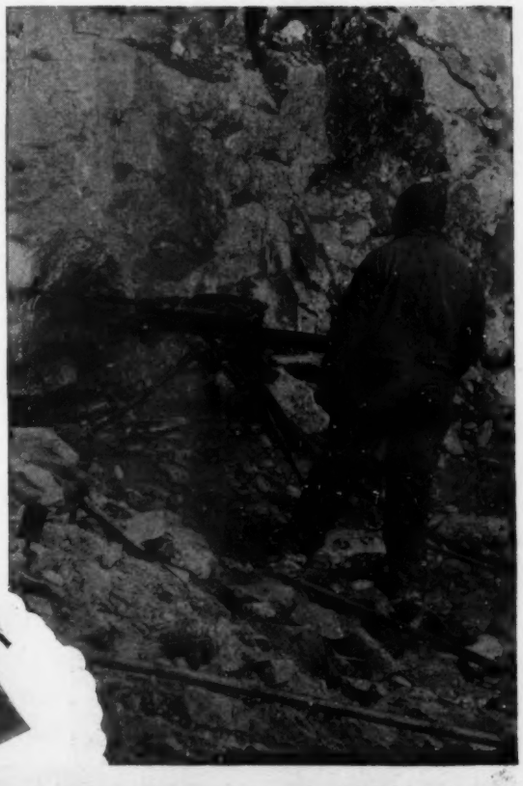




THE CLEVELAND ROCK DRILL CO.
3738 East 78th Street Cleveland, Ohio

At the right: Operating the Cleveland D12 in hard granite.

Bulletins 109 and 111 give all the information on Savings with Cleveland Drill Rigs.



THE CLEVELAND ROCK DRILL COMPANY
3738 East 78th Street, Cleveland, Ohio.

Gentlemen:—Please send me the "Driller's Handbook."

Name .....

Company .....

Address .....

We are now using the following types of machines:

Hand Hammer Drills.....

Paving Breakers .....

Clay Diggers .....

Back Fill Tampers.....

Wagon Drills .....

SKF-EQUIPPED
BUILT BY
WESTERN WHEELED
SCRAPER CO.

400 CU. YDS. IN 11 HRS.

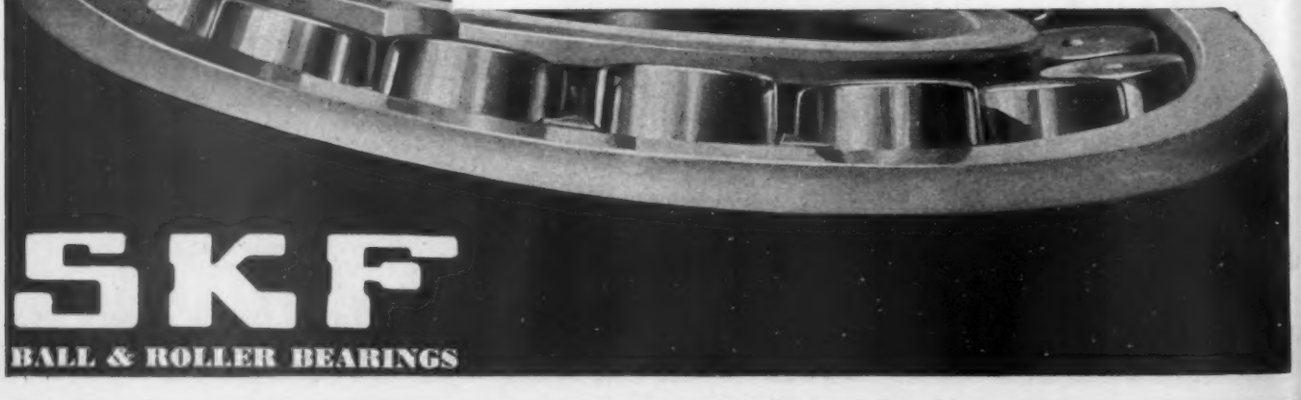
as it crushes rock on SKF *Bearings*

Tough jobs aren't so tough when SKF Ball and Roller Bearings are on the job. Take this Western crushing and screening plant, for instance. It's the kind of job on which SKF have been functioning for years — a job on which their stamina, their ability to take punishment, have been proved.

"No other type of bearing is so efficient for this purpose," says Western of four SKF Spherical Roller Bearings in the jaw crusher. "No other than a self-aligning bearing will adapt itself to the varying positions resulting from shaft deflection. No other bearing prevents binding of either the bearing or the shaft." There isn't much for us to add because SKF Bearings are in a class by themselves.

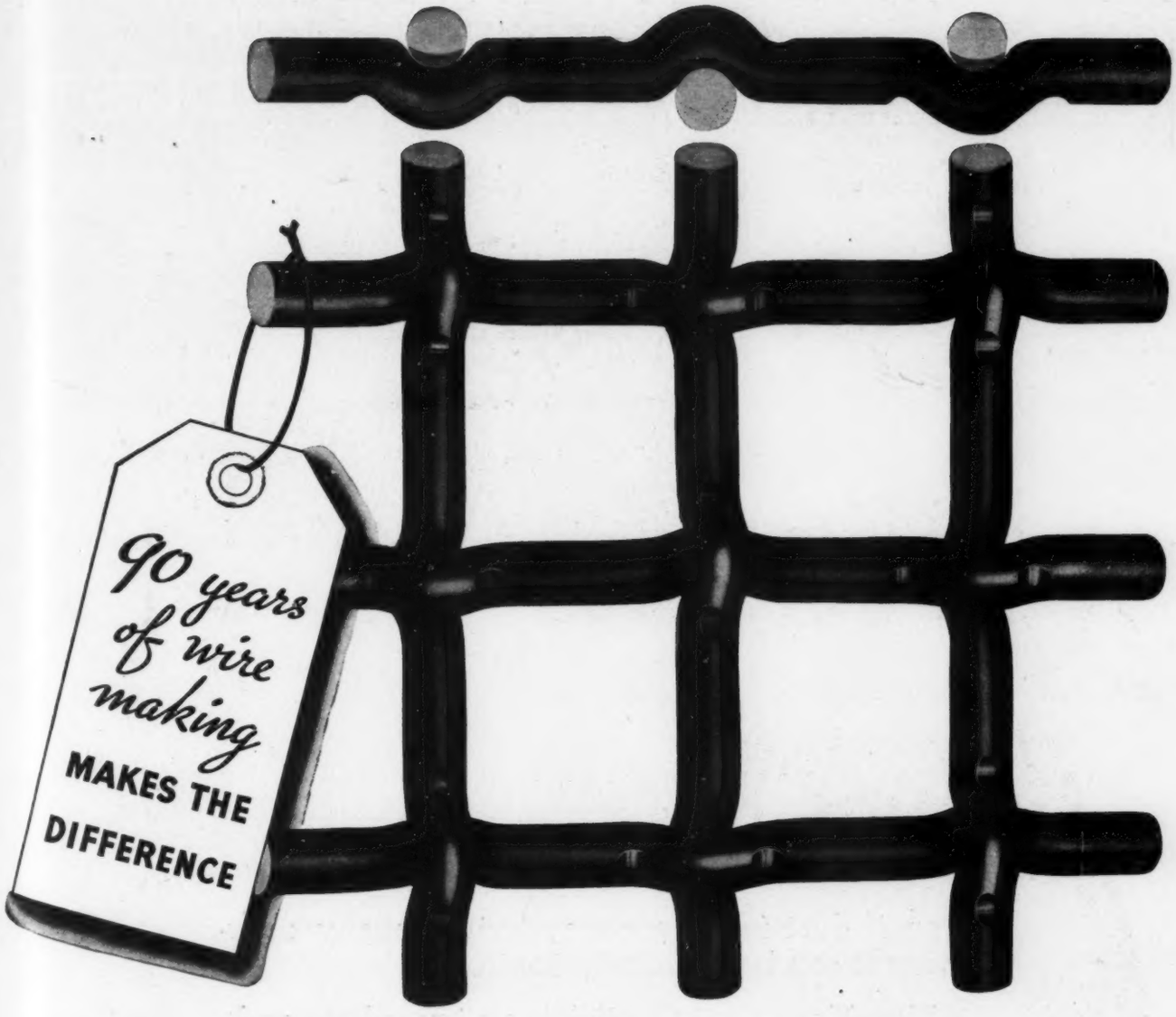
SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA., PA.

3592



SKF

BALL & ROLLER BEARINGS



THAT'S THE STORY IN A *Nutshell*

OVER 90 years of experience in producing wire to meet a wide variety of severe requirements... made available by Roebling to help you solve your wire screen problems.

Many plants have lowered their screening costs by taking advantage of this experience. Why not let us put it to work for you?

Roebling Wire Screens are available in many types and metals to meet a wide range of efficiency, vibration, and abrasion requirements.

We would welcome your request for our cooperation, further information, or a copy of our new Wire Screen Catalog.

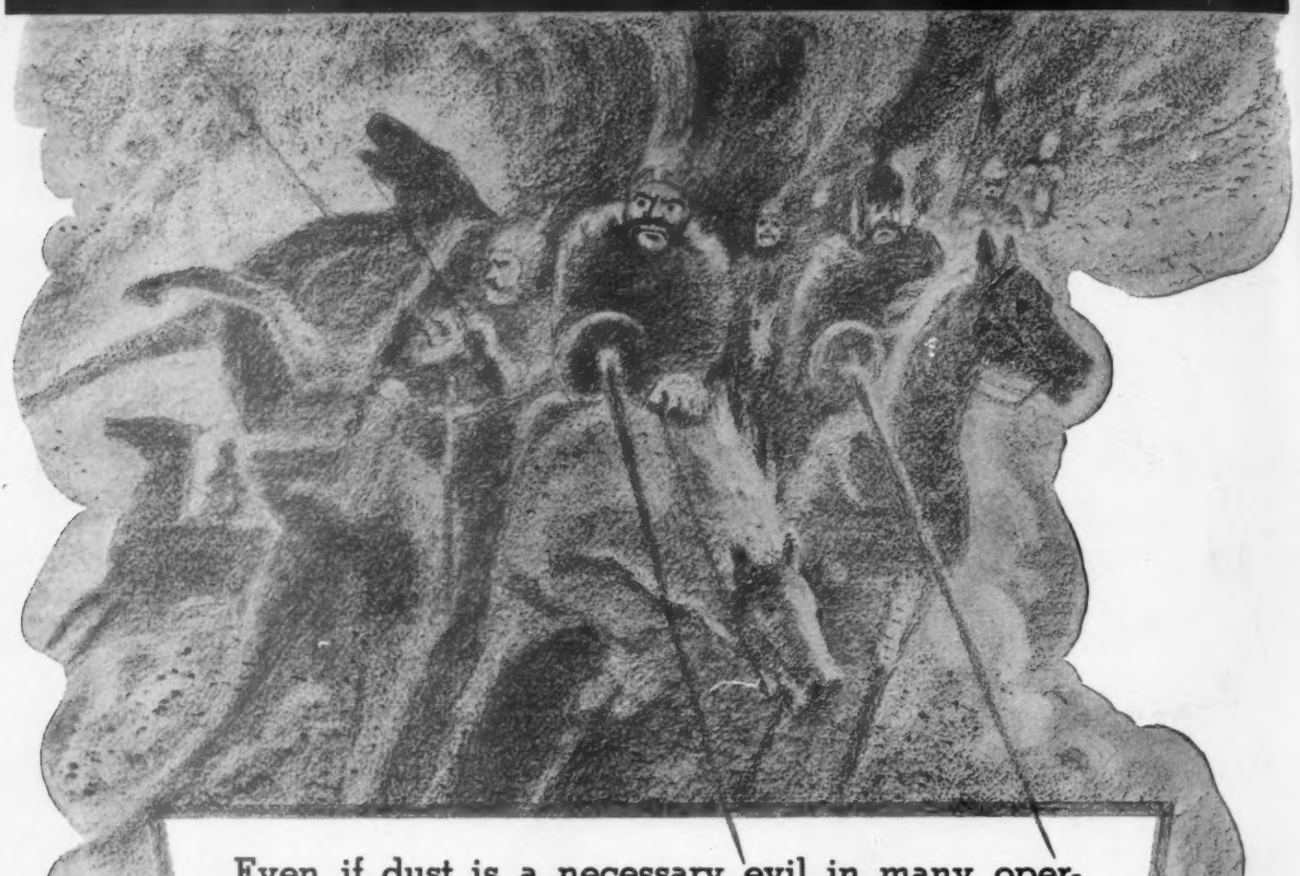
JOHN A. ROEBLING'S SONS COMPANY
TRENTON, N.J. *Branches in Principal Cities*

ROEBLING *Wire Screen*

TRADE JERSEY MARK

ROEBLING – MAKERS OF WOVEN WIRE FABRICS FOR OVER HALF A CENTURY

STOP THIS INVASION OF DUST



Even if dust is a necessary evil in many operations it can be definitely controlled.

Blaw-Knox Dust Control is an immediate and permanent remedy for dust troubles in your industry. Each problem is met with individually designed equipment manufactured under strict technical control. Blaw-Knox Dust Control has the individualism necessary for the many and changing needs of American industry.

If your dust problem is large or small—hot or cold—dry or wet—consult Blaw-Knox for prompt and economical solution.

BLAW-KNOX COMPANY
2035 FARMERS BANK BUILDING, PITTSBURGH, PA.

BLAW-KNOX
DUST CONTROL SYSTEMS FOR INDUSTRY

STABILIZED ROAD MIX

THIS MODERN HIGHWAY SURFACING BRINGS YOU

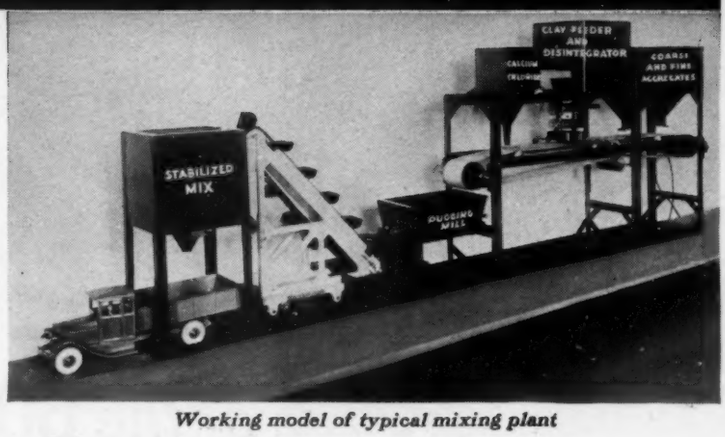
A NEW PROFIT OPPORTUNITY

IN 1936, many an aggregate producer will be hauling over mountains of discarded overburden soils and finer aggregates, and turning them into profit.

For "stabilized mix" comes closer to using "mine run" of pit and quarry than any market the aggregate producer has had before. Years of scientific testing prove that soil pavements are the most efficient and economical of all secondary roads. Hundreds of miles are being built in many states.

And it's all a very simple matter. Proper testing, classifying and proportioning of ordinary soil materials give endurance, plasticity, firmness, cohesion and dustless properties that make a truly good road.

Most aggregate producers have all needed soil fractions available near by. Most of them have a great part of the necessary classifying and mixing equipment. Nineteen thirty-six is to be a year of building secondary roads, village streets and farm-to-market highways. Grasp this opportunity. Learn how it is done. Write for our Bulletin number 24 today.



Working model of typical mixing plant

Calcium Chloride Association

Michigan Alkali Co., 60 E. 42nd St., New York City
Solvay Sales Corp., 40 Rector St., New York City
The Columbia Alkali Corp. • • Barberton, Ohio
The Dow Chemical Company, Midland, Michigan

CALCIUM CHLORIDE

FOR STABILIZING ROAD SURFACES

at the BONNY BLUE MINE *of the* Blue Diamond Coal Co.

Cutting, blasting, loading and rehandling are all accomplished with maximum efficiency at the Bonny Blue (Virginia) mine of the Blue Diamond Coal Company. Two examples of this are shown in these photographs, taken at the property on February 10th, 1936.

One is a unique conveyor system, 4000 feet long, that delivers the coal at the railroad.

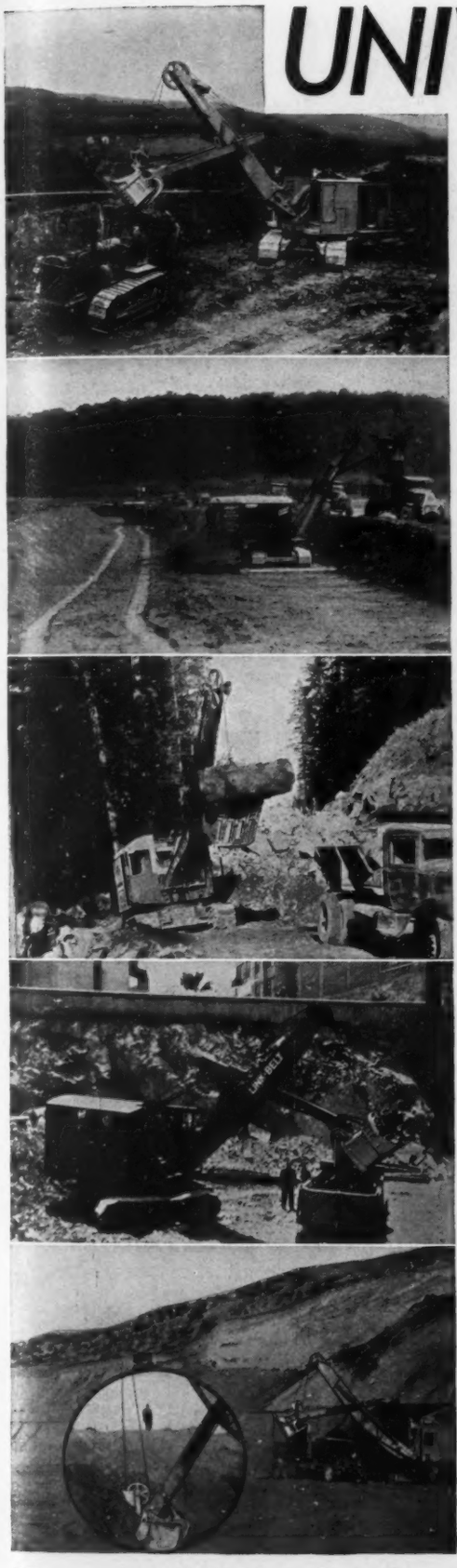
The other is Ensign-Bickford Safety Fuse — uniformly dependable—and always available in a number of standardized brands, each made for a particular set of conditions. Write for the Safety Fuse book.

SF-31

***The* ENSIGN-BICKFORD COMPANY Simsbury, Conn.**

SAFETY FUSE *Since 1836* • CORDEAU-BICKFORD DETONATING FUSE

UNIVERSALLY USED!



All equipped with AMSCO Renewable Lip Dippers!

1. A KOEHRING No. 601
2. A 1½ yd. LORAIN 77
3. A 1½ yd. LIMA No. 601
4. A 1¼ yd. K-40 LINK-BELT
5. Two 2¼ yd. NORTHWESTS

Did you notice almost every shovel shown at the Road Show was equipped with an AMSCO Renewable Lip Dipper?

AMSCO RENEWABLE LIP ONE-PIECE DIPPERS

On almost every big construction job as well as in mines, quarries, and stripping operations — on all makes and sizes of shovels, you'll find AMSCO Renewable Lip Dippers. Because they're *faster loading* and *quicker dumping!* Because the lips are easily renewed in the field without riveting. Because the one-piece all manganese steel body and rugged door construction provide a vastly longer service life.

AMSCO Renewable Lip Dippers effect such great savings in added yardage handled, and speed up digging operations so much that they often show appreciable savings over the cost of keeping old dippers in operation.

Put an AMSCO Renewable Lip Dipper on your shovel stick as soon as possible to greatly increase your digging profits!

AMSCO Renewable Lip Dippers are made in all sizes from ½ to 18 yards for all makes of shovels, with back lugs arranged to fit any dipper stick. Get details and prices today from your shovel manufacturer or our nearest office!

AMERICAN MANGANESE STEEL COMPANY

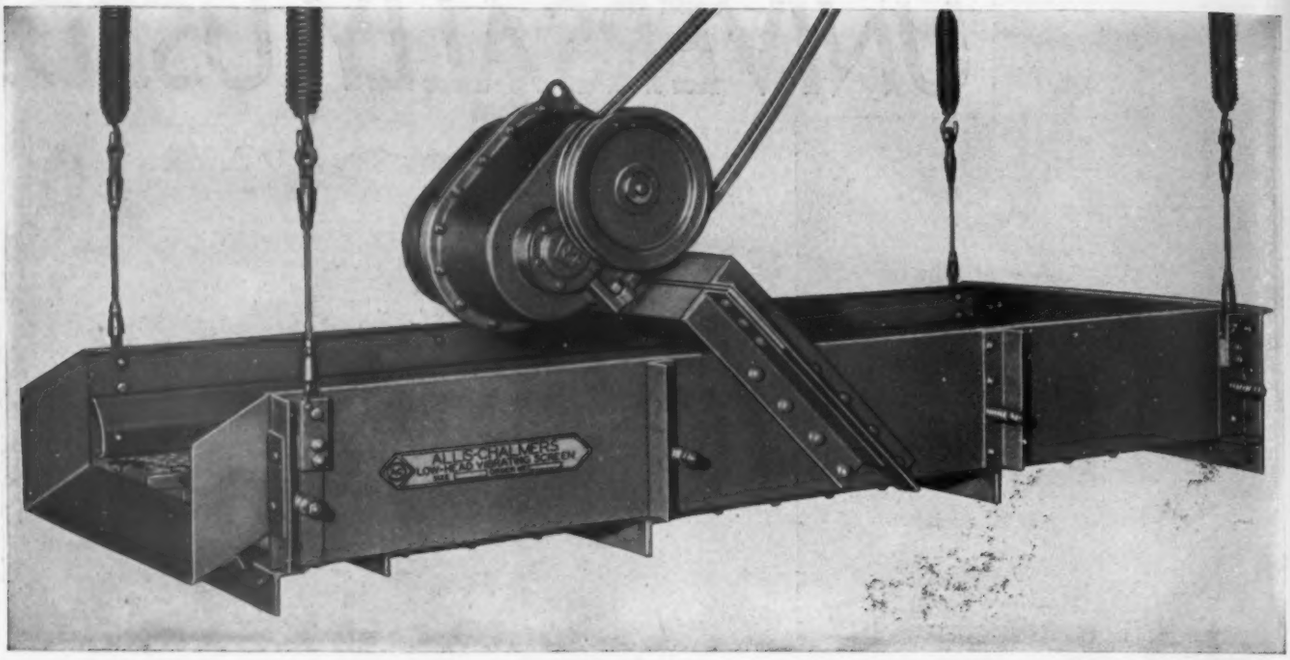
Division of American Brake Shoe & Foundry Company

377 East 14th Street, Chicago Heights, Ill.

Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; Oakland, Calif.; Los Angeles, Calif. • Offices in Principal Cities

AMSCO

TRADE MARK REGISTERED



Low-Head Screen

A highly efficient horizontal vibrating screen requiring:

Low head room; Low power consumption; Low initial cost; Low installation cost; Low maintenance.

The Low-Head Vibrating Screen, as its name implies, is particularly adapted to installations where very little head room is available. When incorporated in the design of new plants, appreciable reductions may be made in the length of elevators and conveyors, resulting in a saving of power to elevate the material.

The Low-Head screen is of unique construction, consisting of two essential parts—the vibrating mechanism and the screen body. The vibrating mechanism is totally enclosed, oil lubricated, and consists of two rotating elements mounted on anti-friction bearings.

The screen body is made up of sturdy structural steel members, and may be of the open or totally enclosed type.

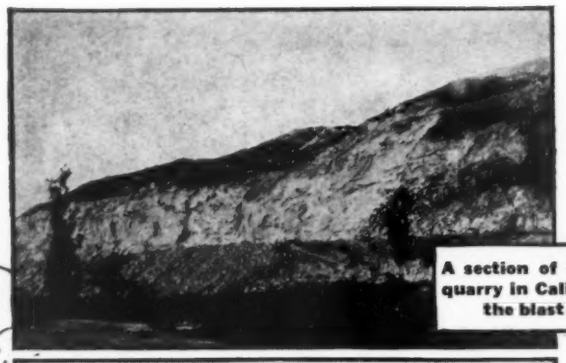
The cable and spring method of suspension confines all of the vibration set up by the mechanism to the screen proper. This is an added protection to the supporting structure.

The Low-Head screen can be successfully applied to the sizing of sand, gravel, crushed rock, ore, slag, coal, coke, salt, fertilizer, wood chips, grain, and other similar materials.

ALLIS-CHALMERS

— Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, U.S.A. —

Not a Spectacular "Movie Shot" but... It Delivered the Goods!



A section of the face of a quarry in California before the blast was fired

View of blast. *Note the lack of escaping gases* although the entire burden is in motion

View of blast after dust and smoke had partially covered the quarry face

An after-blast view showing the large, blocky stone that was wanted for breakwater

STUDY this tribute to Atlas explosives and Atlas service *through the eyes of the camera*. Examine this photographic evidence of explosives operating without waste—of confined gases exerting *all* their force on the rock burden!

Large, blocky jetty-stone was wanted for breakwater use by the Rohl-Connolly Co., operators of the Riverside Quarries. "Seventy percent of the rock," they said, "must weigh ten tons or more!" Atlas gave them 225,000 tons of *what they wanted*—proving again the economy and effectiveness of controlled explosives' force.

Let the Atlas representative give you the full facts about Atlas explosives and Atlas service. Atlas will provide high tonnage per pound of explosives to get the fragmentation *you* want!

ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

Everything for Blasting

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Allentown, Pa.	Joplin, Mo.	New Orleans, La.	Pittsburgh, Pa.	Spokane, Wash.
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ATLAS

EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES

MECHANICALLY CORRECT FROM CRAWLERS TO BOOM POINT SHEAVE

Time has changed the methods of handling material by power excavators and with this change of methods come new and modern shovels, draglines and cranes. A comparison of the machines on the market today will reveal that LIMA engineers have developed a line of shovels, draglines and cranes that are as new and modern as tomorrow. From crawlers to boom point sheave not a single item has been overlooked that will tend to speed up production and give longer, profitable production under all conditions. Their great earning power, low cost of up-keep and their ability to give unsurpassed service in hard digging have gained for them the reputation of being the most modern excavators on the market.

LIMA

LIMA LOCOMOTIVE WORKS, INCORPORATED

SHOVEL and CRANE DIVISION — LIMA, OHIO, U. S. A.

NEW YORK
167th St. & Sedgwick Ave.
The General Supply Co. of Canada, Ltd.
Ottawa, Ont.

CHICAGO
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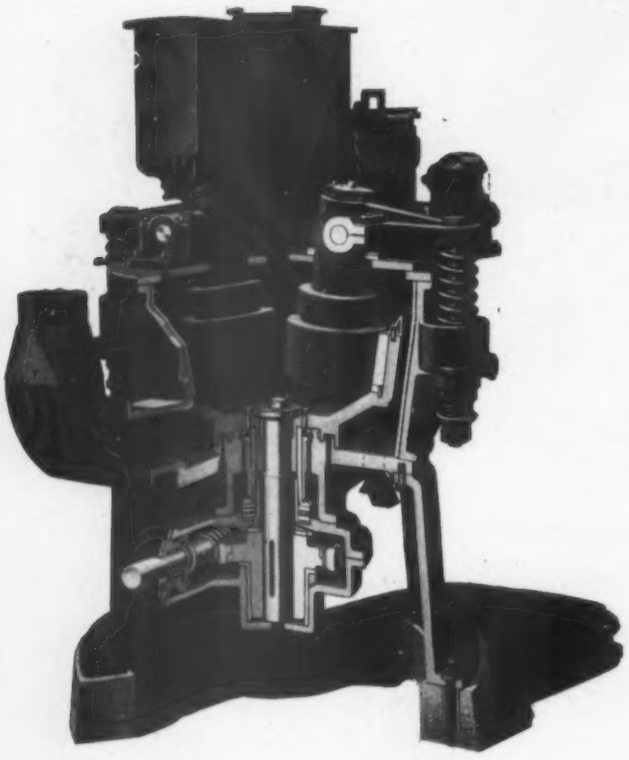

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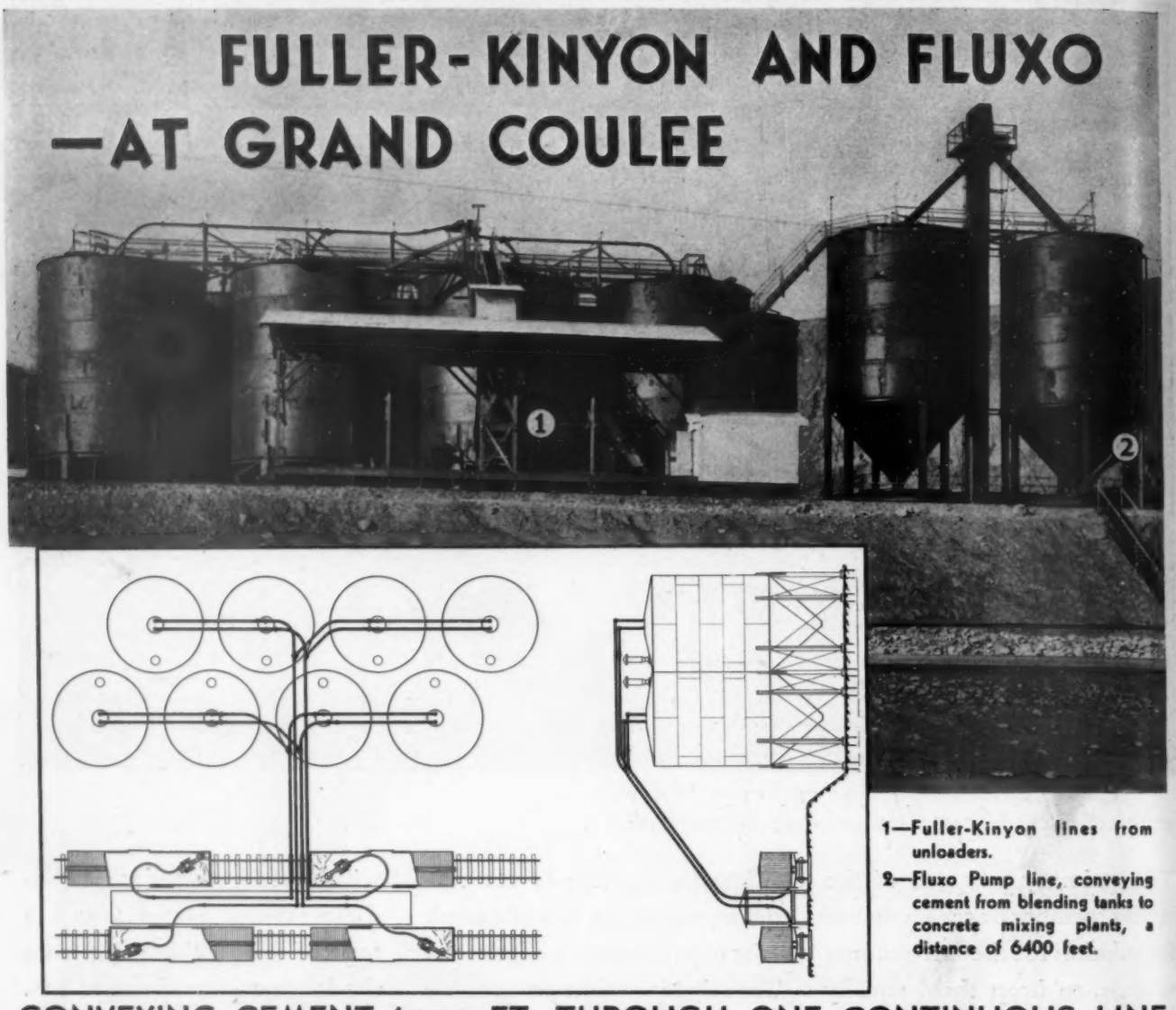
FULLER-KINYON AND FLUXO —AT GRAND COULEE



1—Fuller-Kinyon lines from unloaders.

2—Fluxo Pump line, conveying cement from blending tanks to concrete mixing plants, a distance of 6400 feet.

CONVEYING CEMENT 6400 FT. THROUGH ONE CONTINUOUS LINE

AGAIN Fuller-Kinyon and Fluxo Pumps were selected to serve...this time on one of the large dams being constructed on the Columbia River.

As illustrated in the line drawing above, four Fuller-Kinyon Portable Pumps will be used for unloading bulk cement from box cars to eight storage tanks. The photograph shows only one half of the total Fuller-Kinyon installation, two additional portable pumps and duplicate transport lines are now being installed.

From the eight storage tanks, cement is conveyed to two blending tanks. From this point the Fluxo Pump conveys cement for a distance of 6400 feet to the concrete mixing plants at both ends of the dam. This is the longest continuous pipe line used up to the present time for transporting cement.

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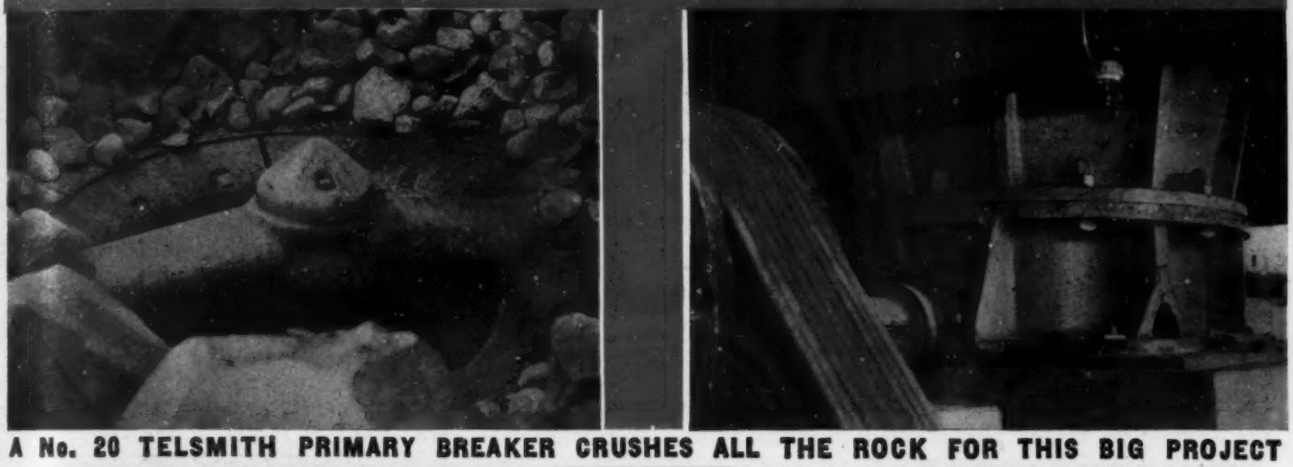
TELSMITH AT THE GRAND COULEE DAM



A No. 20 TELSMITH PRIMARY BREAKER CRUSHES ALL THE ROCK FOR THIS BIG PROJECT

Why was the Telsmith Primary Breaker selected by the M-W-A-K Co. for the million dollar aggregate plant at the Grand Coulee Dam? Why was the entire responsibility for crushing all oversize from the Brett pit, 20 inch to 6 inch boulders, placed on Telsmith?

Because Telsmith never fails . . . it is *the* outstanding performer on hard rock. It has a fixed shaft and sleeve eccentric. Short and compact, it has a *steel* frame and *steel* crown. Force feed oiling permits higher eccentric speeds and faster gyration. Larger head and concave diameters, with greater receiving and crushing area, allow faster feeding. Telsmith's *parallel pinch* starts immediately . . . stops slippage . . . crushes full tilt all the way down . . . *guarantees bigger capacity.* Investigate Telsmith's guarantee against breakage, even by tramp iron. Write for Bulletin C-11.

BC-1-36

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TELSMITH

for stripping overburden hauling material, cleaning up . . . . . use

LE TOURNEAU EQUIPMENT

Le Tourneau 12-yard Carryalls provide a fast, efficient method of moving overburden, gravel, sand or other materials. They are self-loading, self-dumping and roll easily on big pneumatic tires.

For long hauls or where extremely large capacity is desired we recommend the Le Tourneau Cradledump Buggy. It has a capacity of 35 heaped yards and is built for use either with tractors as a full trailer or with trucks as a semi-trailer. Mounted on 18.00x24 pneumatic tires, it moves easily, is extremely flexible and mobile.

Le Tourneau Bulldozers and Angledozers are efficient, fast-moving units for cleaning up around pits, maintaining roadways or moving materials on short hauls.

Le Tourneau equipment is operated from the tractor or truck through cables from a Le Tourneau Power Control Unit which is trigger-quick, powerful and accurate in action. When not operating equipment, cables from the Power Control Unit can be used for clearing operations or general hoist purposes.

Ask your tractor dealer what Le Tourneau equipment can do for you.

A Le Tourneau 6-yard Carryall and 35 H. P. Tractor stripping overburden from a gravel pit.

Le Tourneau Bulldozer clearing mud from a pit.

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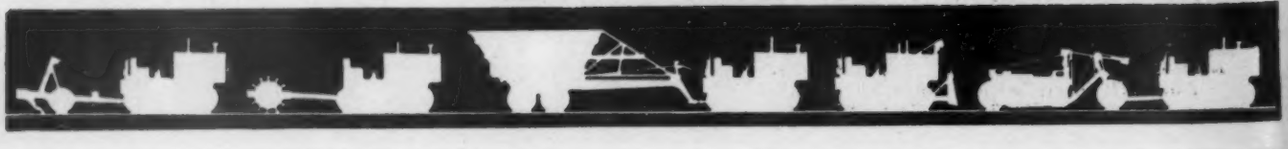
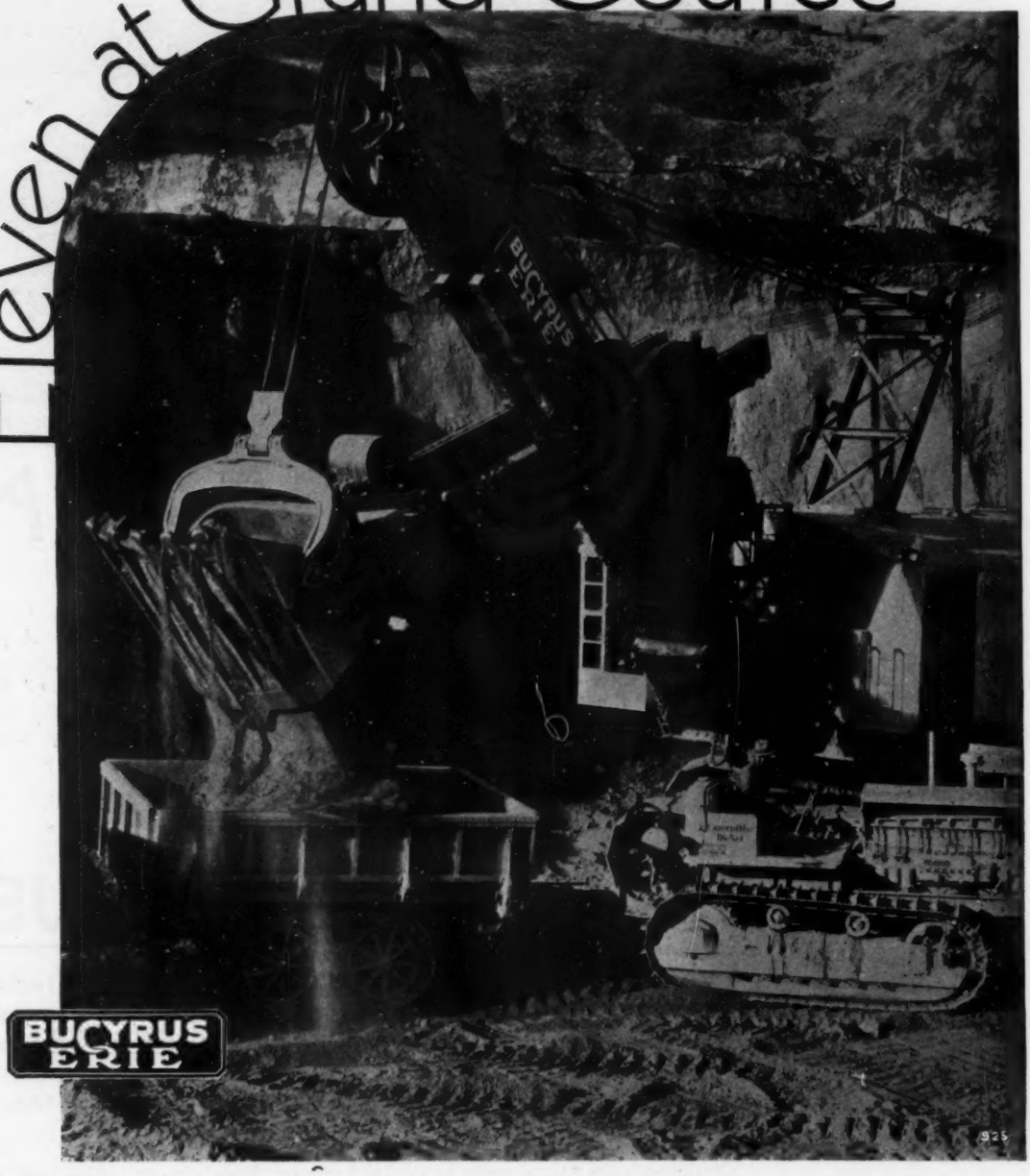
Manufacturers of: Angledozers, Bulldozers, Buggies, Carryall Scrapers, Cranes, Rooters, Sheep's Foot Rollers, Power Control Units, Semi-Trailers

Le Tourneau Cradledump Buggy and Hug Lugger moving 35 heaped yards over soft mud.



Eleven at Grand Coulee



ELEVEN Bucyrus-Eries have played their part in the excellent records for dirt moving and handling aggregate made on the Grand Coulee Project. Here, as on other outstanding engineering projects the world over, Bucyrus-Eries are in the majority because of their big output and dependable performance. Two of every three Bucyrus-Eries purchased are "repeat" orders! If you need to increase profits put one of these modern excavators on your job. Write for bulletin on the size you need.

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EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT . . . SOUTH MILWAUKEE, WISCONSIN

The LARGEST of Them All . . .

A picture of the World's largest Aggregate Plant . . . Jeffrey Equipped . . . now operating with maximum efficiency at Grand Coulee in Washington State.

That's Confidence in JEFFREY

The M-W-A-K Company elected Jeffrey to transport aggregate at Grand Coulee. That was no accident . . . it was confidence bred by the unprecedented performance of previous Jeffrey installations on the same colossal project.
Jeffrey merits this confidence . . . has built up a reputation over a long period of years for dependable and economical sand and gravel handling and reduction equipment.

You, too, can place your trust in Jeffrey Equipment. We do more than furnish the equipment . . . our Engineers will study your problems . . . work with you in the field or office . . . stay on the job until successful operation is assured. We can be counted on to do this.

Perhaps your problem isn't as big as the one encountered at Grand Coulee . . . it may be on a smaller scale . . . but it is similar in that the desire to obtain the resultant high grade aggregate is paramount.

Whether your plant is large or small . . . remember that maximum economy . . . our comprehensive service . . . smoother operation . . . are by-products which cost you nothing. Call on us.

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Rock Products
With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Volume XXXIX Chicago, March, 1936 Number 3

Coöperation Means "Pulling Together"

EVERYONE appears to be enthusiastic over the possibilities of housing construction in the next few years. The portland cement manufacturers are spending probably about a quarter of a million dollars this year to sell *concrete* houses to the ultimate consumer—the home builder and the prospective home builder. When cement manufacturers sell concrete they also sell aggregates, but not any particular aggregate. Sand and gravel, crushed stone, slag, cinders, and burned clay, all make good concrete if sound and if properly used.

The cement industry through its advertising is getting the names of live prospects for concrete homes—tens of thousands of them. These are supplied to building contractors and concrete products manufacturers, including producers of ready-mixed concrete, *gratis*. Fine! But why should not the cement manufacturers go one step farther and also give the lists to aggregate producers, so that these can promote the use of honest-to-goodness commercial aggregates? Surely, everyone concerned wants the concrete made for these new houses to be *good concrete,* so we can all go forward and continue indefinitely replacing cheap temporary houses with those that will endure and have many other virtues as well.

The answer to this calls for serious reflection on the real meaning of coöperation, which was discussed at some length in the December issue of ROCK PRODUCTS under the head: "The Residential and Commercial Building Markets for Rock Products." At that writing there appeared to be no hitch to a grand coöperative effort on the part of all rock products producers and manufacturers to promote "permanent housing" for the benefit of all—coöperative individual efforts, even if not organized.

However, there is a fly in the ointment and it is this: If the names of concrete home building prospects are given to local aggregate producers, as they now are to ready-mixed concrete makers—we are told by one who knows—the kind of competition prevailing among the aggregate producers, which emphasizes the merits of the particular aggregate they have to sell, to the detriment of all competing aggregates, is of such a character that if it gets to the uninitiated home builder or prospective home builder, he is likely to be *unsold* on concrete. In other words, every producer, who in trying to sell his own products emphasizes the alleged defects in those of his competitor, is very apt to leave the prospect with the conviction that there is very little virtue in any—or for that matter in concrete.

Which reminds us of an article in *Printers Ink* some few years ago describing the local advertising of rival automobile dealers, one selling Fords and the other Chevrolets. Each seized on the other's advertising copy to emphasize the defects in the competitor's car and to make odious comparisons. One, for example, pointed out how the headlights of his car were securely braced so they could never rattle; the other seized on this immediately to emphasize that his car was so strongly built that the headlights did not need bracing, etc., etc., etc.

The article was headed: "And He Bought a Horse." The point of the article was that in their keenness to sell a Ford or a Chevrolet these two dealers forgot that their prospect was in the market for an *automobile,* and that their tactics were the very kind to discourage him from buying any car—or, at least, from buying either a Ford or a Chevrolet. Obviously, there is a moral in this story for the concrete aggregates producer; for constant emphasis on the defects of one or the other kind, or producer's, aggregate is certainly likely to lead the uninitiated to the belief that he can find just as satisfactory a product in his own back yard—or it will lead to his selection of lumber or some other building material.

The same general truths apply to the sale of concrete aggregates for any purpose, although of course engineers are capable of using independently acquired knowledge and experience in discounting promotional competitive propaganda. In the final analysis good engineers will use the construction material which gives the best possible results—perfection is not the objective—under a given set of conditions, availability, price on the job, workmanship, and other factors being given proper weights. It is the *economical material* for the special purpose that will be used whether it is lumber, steel, brick or concrete; and if concrete is selected, whether stone, gravel, slag or some other aggregate is the one selected. Ultimately, when more truth is known about concrete and the aggregates that go to make it, producers can sell users on the *relative economy* in the use of their particular product for the particular purpose, without implying that the competitor's product will make a poor concrete, even if properly used. Thus we may all "pull together" instead of pulling down the market when it is most needed.

Mining Engineers Discuss Sand and Gravel—Pebble Phosphate

Three-Day Program, February 17-19, at Annual Meeting of A. I. M. E. Covered Wide Variety of Industrial Minerals

AMONG papers and discussions which would have been of general interest to rock products producers had the program of the annual meeting of the American Institute of Mining Engineers been logically arranged in a single session, instead of sandwiched in with many others over three days, were these: "Log Washers in the Aggregate and Flux Stone Industries," by A. R. Amos, Jr., and S. B. Patterson; "Drying and Processing of Pebble Phosphate in the Florida Field," by C. N. Becker; "Preparation of High-Specification Sand at the Grand Coulee Dam," by Anthony Anable; "Mining Practice in the Florida Pebble Phosphate Field," by C. A. Fulton; "Gravel and Sand Deposits of Eastern Maryland, Adjacent to Washington and Baltimore," by N. H. Darton.

There were many other papers in the sessions on industrial minerals of interest to smaller groups covering the mining or preparation of barite ores, kyanite, tripoli potash, rock salt, clay, fluorspar, diatomite, bauxite, talc and soapstone. These were arranged logically enough for professional mining engineers, in sessions bearing on "milling methods," "mining methods" and "mining geology." However, these papers were designed to attract interest and memberships from eligible engineers who have become primarily producers and manufacturers of some one or two industrial mineral products; unfortunately not many such put in an appearance.

The activities of the industrial minerals division of the Institute, of which Dr. Oliver Bowles, U. S. Bureau of Mines, was elected chairman at this meeting, are of much greater value to the rock products industry than is appreciated at this time; because each year there is being added a volume of valuable reference material, carefully edited, complete with discussion, and indexed. Such sources of operating data, costs, methods, etc., are relatively rare, so far as the rock products industry is concerned, and though the papers receive scant attention when read, they are readily available to be consulted at any later time.

Log Washers

The paper on log washers by A. R. Amos (district representative, Philadelphia, of Smith Engineering Works) and S. B. Patterson (general manager, Calcite Quarry Corp., Lebanon, Penn.), after briefly describing log washers, gave operating data on eight typical installations, washing both crushed stone and gravel. Performance was summarized in the accompanying table.

Concluding, the paper says: "The table gives figures on the performance of log washers in the eight installations described. When installing log washers to treat material that contains varying amounts of foreign substances, it is well to keep the feed point high enough to allow the feed to enter the washers further forward than normal. Thus, when treating material that requires less action in the washers, this will reduce the effective length and save power. There is a tendency in log washers for large pieces to work back of the point of feed and jam at the back end of the box. A feed chute having for its bottom a set of grizzly bars, thus feeding the coarser pieces ahead of the finer, will correct this tendency. In installation No. 1, feed up to 3 in. could be treated without the use of grizzly chutes, but 4-in. stone worked back and this action was corrected by the grizzly chute. Log washers have been designed recently with larger paddles and greater paddle spacing, to treat this size of stone or larger.

"Disposal of the slimes requires a large and convenient settling basin. Gravity flow to this settling basin would be ideal, but slurry pumps operate with a minimum of attention and repair. The power for pumping is a considerable item, for the velocity of flow must be kept high enough to prevent settling in the pipe line, and this high velocity requires more power than pumping clear water where lower velocities are the rule.

"The quantity of water to be furnished raises several questions in addition to those of available supply and size of settling basin. Where the foreign material is a friable soil, a greater quantity of water will help to carry this off by its scouring action as the paddles lift new surfaces to this treatment. But where the material is entirely stiff clay and the churning action of the paddles is necessary to emulsify it, excess water does not help. In installation No. 1, pumping the slimes was necessary, and any increase in water would materially increase the power required for the slurry pump.

"Then there is the consideration of the loss of the finer particles carried into the overflow when using more water than necessary to produce a clean product, when these finer particles are marketable. The method of application of the water may be designed to clean the final product effectively. The sprays should be carried close to the discharge end when water in the discharge is no detriment, to give a final rinsing. This is particularly necessary when as little water as possible is to be used. The dirty water in the box is liable to leave a coating on the final product, which unless a final rinsing is used, must otherwise be removed by sprays in any further screening operation. Application of additional make-up water; that is, water in addition to the sprays that may be necessary to provide sufficient volume to carry off the waste, is best made in the front corners of the box, near the discharge end, thus providing a counterflow of clear water.

"For gravel deposits, where both tenacious clay and soft stone of relatively high specific gravity must be removed, it may be necessary to provide a separate machine employing impact or pulverizing action to follow the logs."

Ward McLanahan, McLanahan & Stone Corp., Hollidaysburg, Penn., criticized the paper as not illustrating or describing the most modern types of log washers. He described many changes and improvements that have been made in recent years, greatly reducing power consumption and increasing capacities. Much interest was expressed by mining engineers in the continued development of this ancient type of machinery.

Pebble Phosphate

The two papers on Florida phosphate mining and preparation covered the subject very comprehensively. Some idea of the character of the pebble phosphate industry was given by Chester A. Fulton, president of the Southern Phosphate Corp., Baltimore, Md., whose paper said: "To produce these 2,000,000 long tons of raw phosphate, they mine and treat about 1,000,000 tons of tailings from older and less efficient operations, about 11,000,000 tons of matrix, and remove from above this matrix some 22,000,000 tons of overburden. . . . Some 34,000,000 tons of material are excavated and handled to produce 2,000,000 tons of merchantable product, which sells for an average of about $4 per long ton, dried." His paper covered prospecting, planning operations, removal of overburden (using large draglines), hydraulic mining, milling the matrix and drying the phosphate.

The method of handling the overburden is of interest and could be widely applied in

PERFORMANCE OF LOG WASHERS
(Figures are on the basis of one double-log washer)

Installation No.	Length of logs, ft.	Material treated	Size of feed, equivalent to square holes in inches	Percentage washed out	Water used, gal. per min.	Speed of logs, r.p.m.	Drive, Hp.	Average horsepower used	Product, net tons per hour
1	25	Limestone	0 —2¼	17	67	21	60	59	20.5
2	25	Limestone	1½—2½		400		100	91	25
3	25	Limestone	0 —1¼	22½	500	20	80	64	45
4	25	Gravel	¼—1¾	23	200	25	50		32.5
5	25	Sand and gravel	0 —2⅝	17½					
6	25	Gravel		11	800	25	40		70
7	25	Gravel	¼—2⅝	10	400	16	60		
8	20	Gravel	¼—1½			19½	50		45

quarrying stone or sand and gravel. It was described with the assistance of the accompanying sketch as follows: "The overburden is removed from the top of the matrix by large electric draglines; commencing, for example, ½ mile or more to the west of the washer and progressing northward for ½ mile with a cut about 210 ft. wide. The overburden is dumped by the dragline into the mined-out cut alongside. The overburden from a 'pioneer' cut, which is the first cut on the edge of the property, must be piled temporarily on what will later be the second cut, and when that is mined, it must be handled again, together with the overburden from the second cut, and dumped in the first cut. To start the second cut, the dragline and all mining equipment must again be moved to the east-west line and the mining proceeds northward again. In this way the pipe lines are kept out of the mined-out cut where the overburden will be dumped.

"The cost of removing overburden and dumping it into the mined-out cut alongside is low. During the 12 months of 1934 an 8-yd. Bucyrus-Erie dragline at one mine operated 4168 hr. out of a possible 8760 hr. and removed 2,471,781 cu. yd. at an average rate of 593 cu. yd. per hour, consuming 0.555 kw.-hr. of electric energy per yard, at the following cost:

		Cost Per Cubic Yard*	
Labor:	Operating	$0.0047	
	Moving	0.0003	
	Maintenance	0.0024	$0.0074
Power:			0.0045
Supplies:	Operating	0.0002	
	Maintenance	0.0062	0.0064
	Total cost		$0.0183

*Matrix weighs 125 lb. per cubic foot.

Other interesting data were given on hydraulicking the matrix, summarized as follows:

"The average cost of hydraulic mining and pumping to the washer at one mine during 1934 was 12c per cu. yd., as follows:

		Per Cubic Yard		
Labor:	Operating	$0.0203		
	Moving	0.0089		
	Maintenance	0.0106		
	Superintendence	0.0074	$0.0472	
Power:			0.0462	
Supplies:	Operating	0.0053		
	Maintenance	0.0122	0.0175	
Other direct costs:				
	Moving, use of equipment	0.0008		
	Maintenance, use of equipment	0.0002		
	Upsetting matrix	0.0089	0.0099	$0.1208

"During this year the pit was in operation 4413 hr. out of a possible 8760 hr., mining and pumping 1,024,999 cu. yd. of matrix an average distance to the washer of about 3000 ft. The average thickness of the matrix was 8.46 ft. There were consumed 5.7 kw.-hr. per cu. yd. When mining operations are near the washer, pumping costs are at the minimum, other things being equal. The difference in cost per cubic yard due to increased distance from the washer may be stated as an increase of 1c for each booster pump in the line. The average distance each booster pumps is 1500 ft."

Drying and Processing

The paper of Charles N. Becker, assistant manager, Southern Phosphate Corp., Ridgewood, Fla., gave much valuable data on the drying and partial calcining of pebble phosphate, its handling wet and dry, but interest in this paper would naturally be confined largely to those in the phosphate industry. Like the paper by the president of the corporation, already abstracted, valuable cost data are included. A third paper of interest to phosphate producers was "Phosphate Fertilizers by Calcination Process—Volatilization of Fluorine from Phosphate Rock at High Temperatures," by K. D. Jacob, D. S. Reynolds, and H. L. Marshall, of the fertilizer research division, Bureau of Chemistry and Soils, U. S. Department of Agriculture.

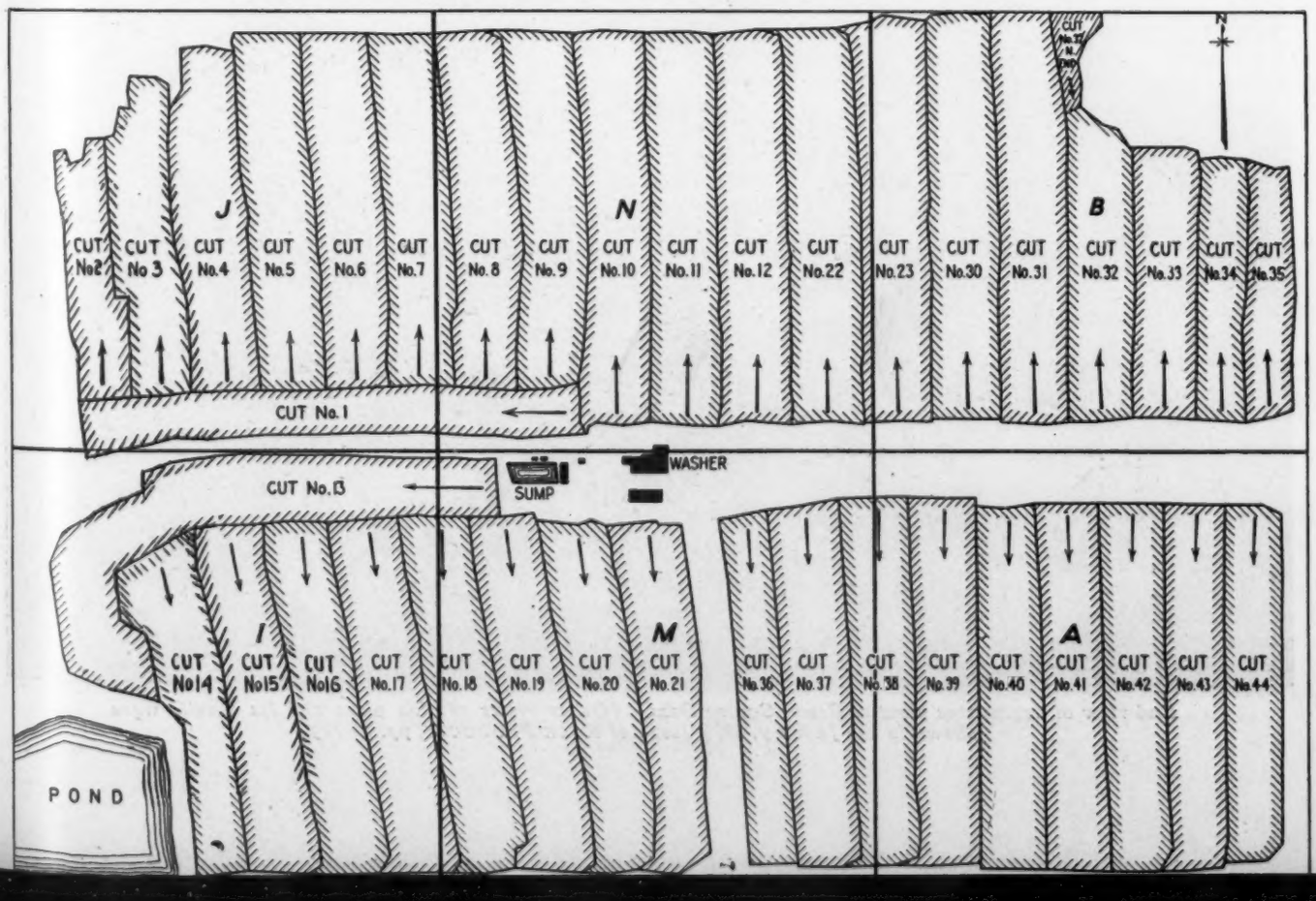
Sand and Gravel

Anthony Anable's paper on sand preparation for Grand Coulee dam concrete is abstracted elsewhere, on the page following Edmund Shaw's article on the dam aggregates plant.

The paper by N. H. Darton, U. S. Geological Survey, on "Gravel and Sand Resources of Eastern Maryland," dealt with the subject geologically, and concluded that a little more geological information would be helpful to producers, who in this locality, at least, usually overestimate their resources. The following paragraph summarizes:

"There has been much misconception of geologic relations of the deposits, especially by the producers of upland gravels. In their estimates of tonnage prospects they include talus in the thickness of the gravel cap, and when this talus is removed they are surprised to find that the gravel cap is only at the top of the plateau and rarely more than 25 ft. thick, although of great extent. Ordinarily in such cases it is found that the machinery has been placed too low on the slope and excavated material has to be moved a long distance. The matter of water supply is also disappointing at some of the works."

Method of handling overburden applicable in quarrying stone or sand and gravel



HANDLES 2500 Tons Per Hour: *WASTES* 1000 to 1500 Tons of *SAND*

Grand Coulee Dam Aggregates Plant to Service the World's Largest Concrete Job

By Edmund Shaw,
Contributing Editor, Rock Products

GRAND COULEE DAM, on the Columbia River, Washington, is the world's biggest concrete job. It will contain almost four times as much concrete as the Boulder dam. One of the most interesting sand and gravel plants the writer has seen supplies the aggregates.

The size of the plant in this case was determined by what had to be thrown away. At Boulder dam nature placed material of the right proportions, fine and coarse, to make concrete; so that practically none had to be discarded. At Grand Coulee there is so much excess sand that up to 2500 tons per hour may have to be fed to give the 1000 tons per hour of finished product. There is no use here for the excess sand. It has to be removed and stored, permanently, at low cost, and the quantity will eventually run into millions of tons; and the waste problem is complicated by having to save fine sand.

A second difficulty was the position of the deposit, more than 900 ft. above the river, and more than 400 ft. above the only available plant site. The slope is 1½ to 1, and a boulder started would roll all the way down. This necessitated study as to how to get the material into the plant. The problem was solved by a system that not only gives an even feed but provides a more than adequate storage of raw material.

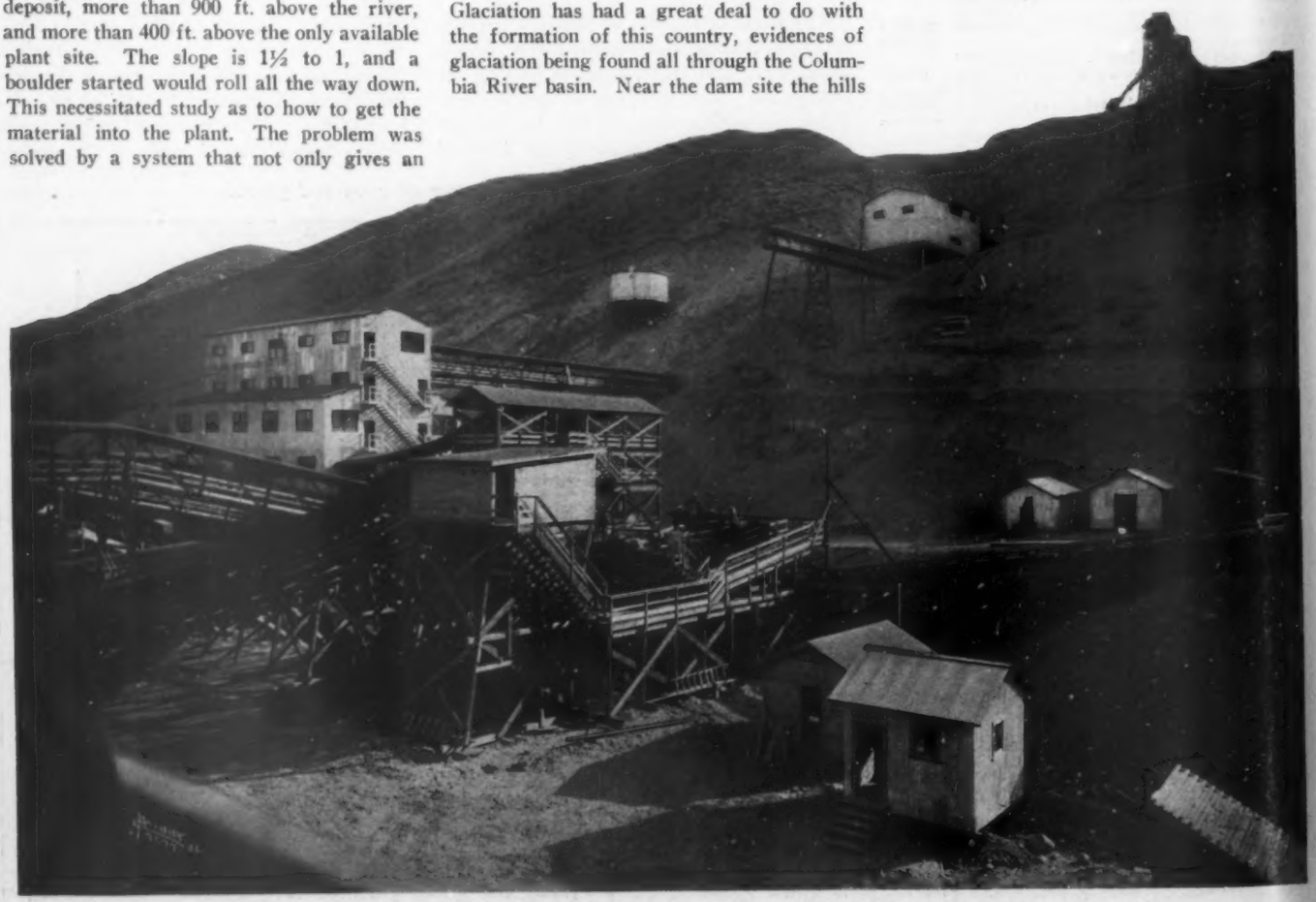
After the material has been washed and screened and classified into five sizes, and the waste disposed of, the finished products have to be transported to storage, 6000 ft. distant, and then across the river to the concrete mixing plant to use at the rate of 750 tons per hour. This is done by an ingenious system of belt conveyors, controlled by one man, more than a mile away from the bin gates, who can select any material and bring it to its storage pile, from which it may be taken to the mixers by conveyors crossing the river on a suspension bridge.

Location and Deposit

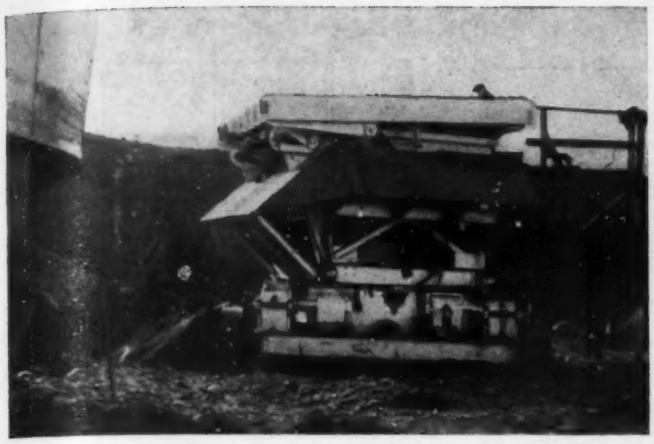
The underlying country rock is granite, in many places covered with lava flows (basalt) but not near the dam. The river has cut a great gorge down through the granite and in some places the walls are 1000 ft. high. Glaciation has had a great deal to do with the formation of this country, evidences of glaciation being found all through the Columbia River basin. Near the dam site the hills are mostly of granite, but there is one great hill which is quite plainly of fluvo-glacial origin, the material lying in different strata. It is this hill that is being worked for aggregates.

A space 1000 by 4000 ft. has been stripped 3 ft. deep to get rid of sage brush roots. Test pits in this, 4 ft. square, show the sand and gravel to go down more than 400 ft. There is a fine sand stratum at 80 ft. that will ultimately have to be wasted. However, it is estimated that more than will be needed for the first contract of about 4,000,000 cu. yd. can be taken from ground already developed. Stripping was by tractors and scrapers.

The material is largely silicious. The sand is apparently derived from granite and basalt (the lava flows). The pebbles and cobbles that were observed were quartzite and granite with a considerable proportion



End view of aggregates plant at Grand Coulee Dam. (Other views of this plant and its details were shown in the January, 1936, issue of ROCK PRODUCTS, pp. 75-79)



Left: Powered feed hopper. It follows the shovel and throws off boulders from the bar screen on top. Right: The hopper in discharging position

of basalt. There is a difference of opinion regarding the basalt pebbles, some authorities claiming that they are "erratics," and not true moraine material washed into this deposit. Others think there are so many of them that they must have had another origin.

Shovels Serve Powered Hopper

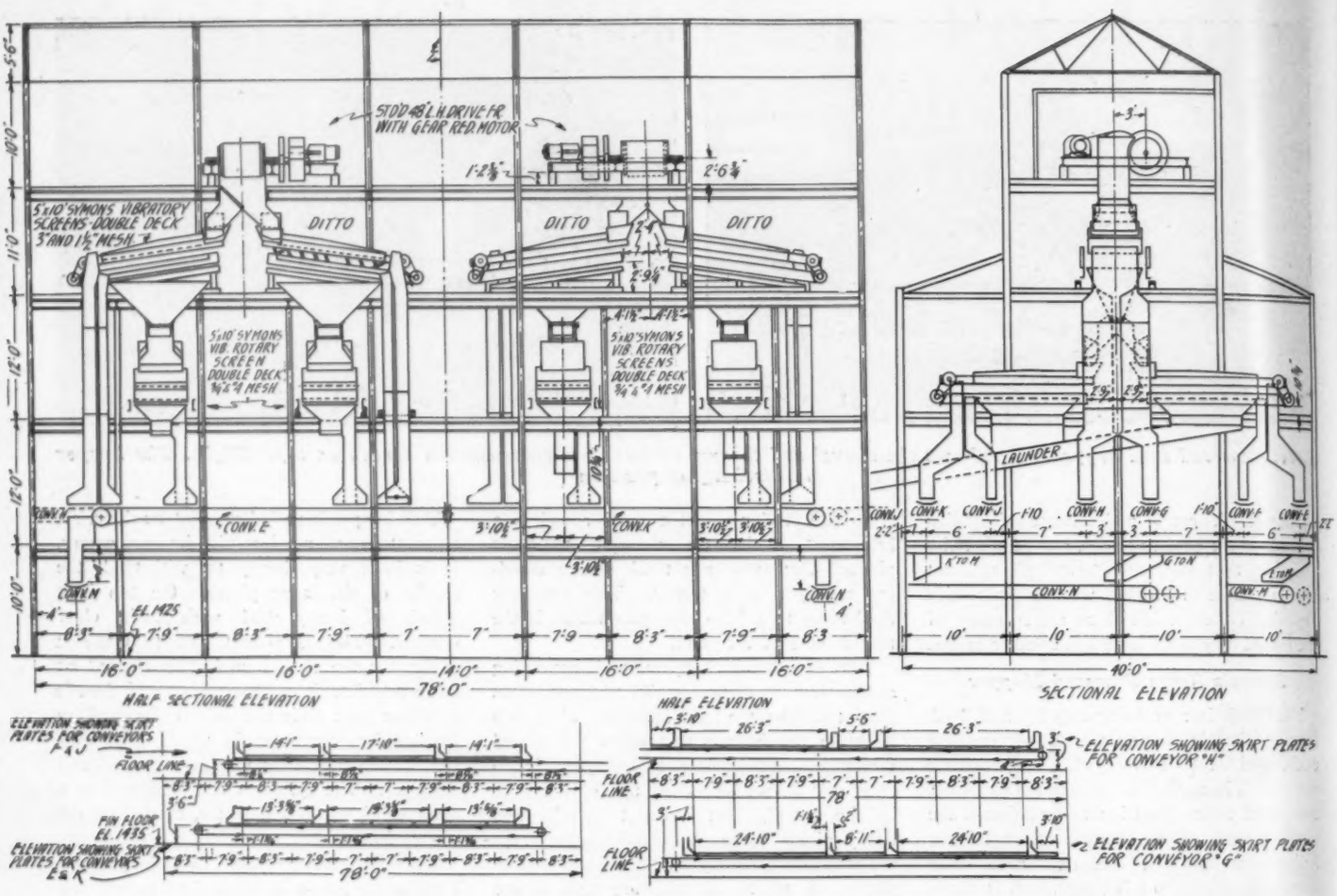
The bank is now being dug by two 4-yd. Marion electric shovels which will later be exchanged for two 5-yd. Bucyrus-Erie shovels. The method of getting the dirt from the shovel to the plant is an adaptation of the method used at the Radum plant of the Kaiser Paving Co., Radum, Calif. The shovel discharges to a hopper which is above one end of a conveyor carried on a bridge truss 200 ft. long. At the other end is a hopper, to which the conveyor truss is pivoted, that runs on a track over a standing conveyor on a trestle. This conveyor discharges to a high stockpile which is the raw storage of the plant.

The design of hoppers and conveying system has been considerably changed from that at Radum, the most important difference being in the hopper that takes the shovel discharge. At Radum this hopper is so light that it can be picked up and set over by the shovel. But it has to handle few heavy pieces while at Grand Coulee there are occasional heavy boulders and many pieces up to 14 in. that are sent to the crusher.

This hopper is an independent machine, set on tractors and moving with its own power. It is built very heavy to withstand the shocks of the large pieces. On top is a grizzly of heavy steel with 14-in. clear spacing. This is almost flat, to make it easier for the shovel, and it is cleared of large boulders in a clever way. Hydraulic cylinders first slide the grizzly forward so the boulders cannot strike anything as they fall. Then they tip up the grizzly and roll them off. The cylinders are connected to a pressure oil pump and motor, carried on the hopper frame.

Below the hopper proper is a 48-in. Jeffrey-Traylor feeder—a shaking feeder, and the shake given by solenoids actuated by an

Bridge from the loading hopper to the belt conveyor leading to storage ahead of screening plant



Cross-sections of the washing and screening plant at Grand Coulee Dam aggregates plant

alternating current on which a D. C. current is superimposed to vary the vibration, as it is in the Jeffrey-Traylor screen. The feed is very steady, the material flowing off as though it were a current of water.

It can be seen from this that the receiving hopper is a carefully designed machine. The advantage over the simpler form is a great saving of time. Having its own power the hopper can follow the shovel and always be in place to take the discharge. The feeder insures a steady even feed to the belt and prevents clogging.

The bank will be worked down in two benches, changes in the conveying system being made to correspond. On each bench the shovel will work on a semicircular face and the hopper can follow so closely that the bucket swings will average only 90 deg. When the conveyor has swung around through a half-circle the shovel will dig into the bank as far as it can reach conveniently and will work out another half-circular cut, moving in the opposite direction. The length of the bridge conveyor is such that the shovel can go into the bank 170 to 180 ft. without having to splice a piece to the standing conveyor.

The hopper which straddles the belt is made with a universal motion so that it cannot easily be overturned or damaged by the moving of the bridge conveyor.

Raw Storage—Crushing and Coarse Screening

As noted, the material falls from the standing conveyor to a high stockpile. This is over a concrete chamber in which there are two 48-in. Jeffrey-Traylor feeders, each capable of delivering 1250 tons per hour. They discharge to a 60-in. belt, running in a tunnel. The construction of this tunnel and several others like it in the plant is most interesting. The framing is of 4x10-in. timbers, cut so as to make a horseshoe arch and fastened with spikes driven into holes bored in the shop where the pieces were cut. Every other set has a knee at the bottom so that the bearing will be on a wider area of ground. This construction is very resistant to compression. Marks were made on the wall before the high stockpile was built up on one end of the tunnel and they later showed that there had been no settlement. The marks will show, as the pile builds up.

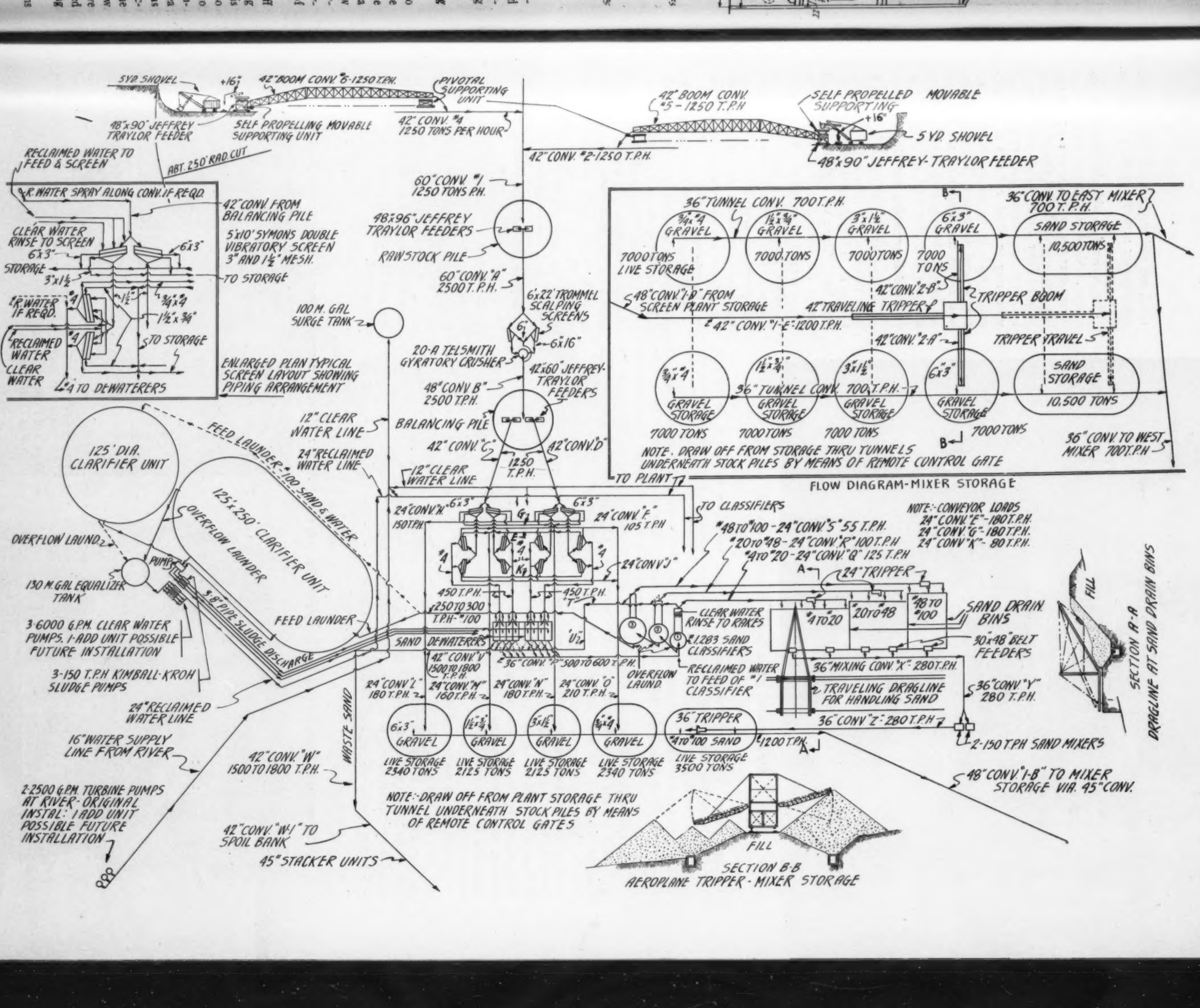
The 60-in. belt discharges into a large steel "splitter box" which divides the flow between two Allis-Chalmers heavy duty trommels, each 6 ft. in diameter and 22 ft. long, with round openings equivalent to 6-in. square openings. The oversize, 6 to 14-in., falls directly to a 20-in. Telsmith crusher. This is set so that it will not make any oversize. There is no screen and return connected with it, which is possible because the tonnage of 6 to 14-in. is not large. The product joins the undersize of the trommels and all goes to a stockpile inserted in the flowsheet to equalize, or balance, the feed going to the screens.

Screening and Classifying—"Lowering Ladders"

From this point on the feed divides into two streams, each feeding one of duplicate screening units. From the balancing pile the material (all minus 6-in. now) falls into a concrete chamber like that under the raw storage, in which are four 42-in. Jeffrey-Traylor feeders in pairs. Each pair delivers to a 42-in. belt, each belt feeding half of the screening plant.

Water is added as the material comes off these conveyors. The bank material as dug seems dry enough to screen dry, and this method was considered, the sand being so nearly clay free as to need no washing to clean it. But in the wet season dry screening would have required an enormous area of screens, and so much attention, that it was rightly judged to be impracticable. A second good reason for a wet plant was the contour of the ground which flattens below the mill site. And of course it would have been difficult to save much of the needed fine sand with any ordinary dry-screening system.

All the screening is done with Symons


5YD SHOVEL
+16'
42" BOOM CONV. 6-1250 T.P.H.
PIVOTAL SUPPORTING UNIT
48"x90" JEFFREY TRAYLOR FEEDER
SELF PROPELLING MOVABLE SUPPORTING UNIT
42" CONV. #4 1250 TONS PER HOUR
42" BOOM CONV. #5 - 1250 T.P.H
SELF PROPELLED MOVABLE SUPPORTING
+16'
5 YD. SHOVEL
42" CONV. #2-1250 T.P.H.
48"x90" JEFFREY-TRAYLOR FEEDER
RECLAIMED WATER TO FEED & SCREEN
ABT. 250' RAD. CUT
R. WATER SPRAY ALONG CONV. IF REQD.
42" CONV. FROM BALANCING PILE
5'x10' SYMONS DOUBLE VIBRATORY SCREEN 3" AND 1½" MESH.
CLEAR WATER RINSE TO SCREEN
6'x3'
STORAGE
3"x1½"
TO STORAGE
R. WATER IF REQD.
#4
1½"
¾"x¾"
1½"x¾"
RECLAIMED WATER
CLEAR WATER
TO STORAGE
#4 TO DEWATERERS
ENLARGED PLAN TYPICAL SCREEN LAYOUT SHOWING PIPING ARRANGEMENT
60" CONV. #1 1250 TONS P.H.
48"x96" JEFFREY TRAYLOR FEEDERS
RAWSTOCK PILE
60" CONV. "A" 2500 T.P.H.
6'x22' TROMMEL SCALPING SCREENS
6'
6"x16"
100 M. GAL SURGE TANK
20-A TELSMITH GYRATORY CRUSHER
42"x60" JEFFREY-TRAYLOR FEEDERS
48" CONV. B" 2500 T.P.H.
BALANCING PILE
42" CONV. "C"
1250 T.P.H.
42" CONV. "D"
12" CLEAR WATER LINE
24" RECLAIMED WATER LINE
12" CLEAR WATER LINE
FEED LAUNDER
100 SAND & WATER
125' DIA. CLARIFIER UNIT
125'x250' CLARIFIER UNIT
OVERFLOW LAUNDER
OVERFLOW LAUND.
PUMP
130 M. GAL EQUALIZER TANK
3-6000 G.P.M. CLEAR WATER PUMPS. 1-ADD UNIT POSSIBLE FUTURE INSTALLATION
8'-8" PIPE SLUDGE DISCHARGE
FEED LAUNDER
3-150 T.P.H KIMBALL-KROH SLUDGE PUMPS
24" RECLAIMED WATER LINE
16" WATER SUPPLY LINE FROM RIVER
2-2500 G.P.M. TURBINE PUMPS AT RIVER - ORIGINAL INSTAL: 1 ADD UNIT POSSIBLE FUTURE INSTALLATION
42" CONV. "W" 1500 TO 1800 T.P.H.
WASTE SAND
42" CONV. "W-1" TO SPOIL BANK
45" STACKER UNITS
6'x3'
G1
24" CONV. "H"
24" CONV. "F" 105 T.P.H
150 T.P.H
E-3
K1
24" CONV. "J"
450 T.P.H.
250 TO 300 T.P.H. - "100
450 T.P.H. "T"
SAND DEWATERERS
"U"
42" CONV. "V" 1500 TO 1800 T.P.H.
36" CONV. "Y" 300 TO 600 T.P.H.
24" CONV. "L" 180 T.P.H.
24" CONV. "M" 160 T.P.H.
24" CONV. "N" 180 T.P.H.
24" CONV. "O" 210 T.P.H.
OVERFLOW LAUND.
RECLAIMED WATER TO FEED OF "1 CLASSIFIER
6'x3' GRAVEL
1½"x¾" GRAVEL
3"x1½" GRAVEL
¾"x¾" GRAVEL
LIVE STORAGE 2340 TONS
LIVE STORAGE 2125 TONS
LIVE STORAGE 2125 TONS
LIVE STORAGE 2340 TONS
36" TRIPPER
#4 TO #100 SAND
LIVE STORAGE 3500 TONS
1200 T.P.H.
NOTE:- DRAW OFF FROM PLANT STORAGE THRU TUNNEL UNDERNEATH STOCK PILES BY MEANS OF REMOTE CONTROL GATES
FILL
SECTION B-B
AEROPLANE TRIPPER - MIXER STORAGE
36" TUNNEL CONV. 700 T.P.H.
36" CONV. TO EAST MIXER 700 T.P.H.
¾"x#4 GRAVEL
1½"x¾" GRAVEL
3"x1½" GRAVEL
6"x3" GRAVEL
SAND STORAGE
7000 TONS LIVE STORAGE
7000 TONS
7000 TONS
7000 TONS
10,500 TONS
48" CONV. 1-B" FROM SCREEN PLANT STORAGE
42" CONV. 2-B"
42" TRAVELING TRIPPER
TRIPPER BOOM
42" CONV. "1-E" 1200 T.P.H.
42" CONV. "2-A"
TRIPPER TRAVEL
GRAVEL STORAGE
SAND STORAGE
36" TUNNEL CONV. 700 T.P.H.
7000 TONS
10,500 TONS
36" CONV. TO WEST MIXER 700 T.P.H.
NOTE. DRAW OFF FROM STORAGE THRU TUNNELS UNDERNEATH STOCK PILES BY MEANS OF REMOTE CONTROL GATE
FLOW DIAGRAM-MIXER STORAGE
TO PLANT
TO CLASSIFIERS
NOTE:- CONVEYOR LOADS
24" CONV. "E" - 180 T.P.H.
24" CONV. "G" - 180 T.P.H.
24" CONV. "K" - 80 T.P.H.
"48 TO "100 - 24" CONV. "S" 55 T.P.H.
"20 TO "48 - 24" CONV. "R" 100 T.P.H
"4 TO "20 - 24" CONV. "Q" 125 T.P.H
24" TRIPPER
CLEAR WATER RINSE TO RAKES
#1283 SAND CLASSIFIERS
"4 TO 20
"20 TO 48
"48 TO "100
SAND DRAIN BINS
30"x48" BELT FEEDERS
36" MIXING CONV. "X" 280 T.P.H.
TRAVELING DRAGLINE FOR HANDLING SAND
36" CONV. "Y" 280 T.P.H.
36" CONV. "Z" 280 T.P.H
2-150 T.P.H SAND MIXERS
48" CONV. "1-B" TO MIXER STORAGE VIA. 45" CONV.
FILL
SECTION A-A
DRAGLINE AT SAND DRAIN BINS

Air-operated gates in the conveyor tunnel

shaking screens. There is no shake transferred to the building that can be felt by one standing on the floor, for the building was designed and braced to avoid vibration; and this type of screen is designed not to shake the housing.

Two double deck 5x10 Symons screens in each unit on the upper floor remove the coarsest sizes, 6-in. to 3-in. and 3-in. to 1½- in. These go down through "lowering ladders" to conveyors on the lower floor of the building. The "lowering ladders" are vertical chutes made of steel, filled with baffle plates, set to form alternating stone pockets, so that the material flows slowly back and forth across the chute as it descends.

The undersize of the lower decks is 1½-in. and finer, and this goes, with all the water, to four 5x10-ft. Symons screens in each unit (eight in all) on the floor below. The decks here are covered with ¾-in. and No. 4 wire mesh; and the products, 1½-in. to ¾-in. and ¾-in. to No. 4, go through lowering ladders to conveyors on the lower floor.

Thus each product of the screens goes to its own "collecting conveyor," these conveyors being 6 or 7 ft. apart. They discharge on cross conveyors, one for each collector, set about 70 ft. apart, so that a good sized stock pile may be built by each discharge. The discharges go into lowering ladders open at the sides so that the material may escape at any level as the pile builds up.

These storage piles are an important part of the plant design. All the finished products have to be taken to storage over 6000 ft. of conveyors. If the piles were not large enough to hold a shift's production of each size the man sending the materials to storage would have to change from one gate to another, and change the tripper to different storages, several times a day. So these storage piles have been figured to hold more than a shift's running of free flowing material, and each gate from a pile to the storage conveyor need not be opened more than once a shift.

The water fed with the material to the screens, and that sprayed on the material as it runs over the screens, is mostly water that has been used and then cleared by settling in large Dorr clarifiers. As some water is lost with the outgoing wet material fresh water may be added, and part of this addition is made by sprays just before the discharge from the screen. The spray nozzles used are of the Binks type, and the water has sufficient head to be delivered with considerable force, for good washing.

Sand Dewatering and Classifying

The sand that is the undersize of the 4-mesh decks of the screens first goes to a battery of Jeffrey dewaterers, of the chain-drag type. There are eight of these placed side by side, each with 10 ft. flights, covering an area of 50 by 100 ft. Nothing about the plant gives such a good idea of the enormous tonnage that is being handled as the sight of this great battery of dewaterers. There are two drives for the eight dewaterers but any two may be run as a unit by disconnecting clutches.

The dewatered sand falls into tall steel chutes and is split between two conveyors. One goes to the classifiers where the sand is separated into three products, which are afterward combined to produce the grading desired by the government engineers. The remainder is sent to the waste conveyor and stacker. The overflow of the dewaterers goes to the Dorr clarifiers. The solids it carries are 100-mesh and finer.

Separating and Combining Sand Fractions

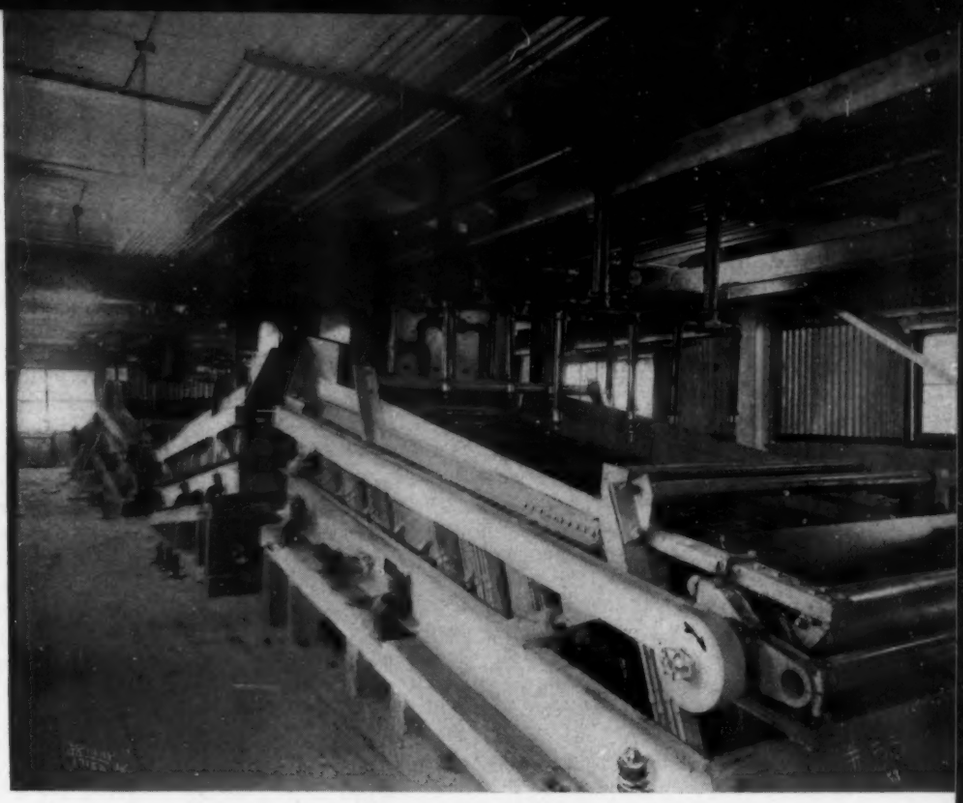
The conveyor for waste sand is 42-in. wide and has a capacity for 1000-1500 tons per hour. It connects with a stacking conveyor which will be extended as the waste dump grows. According to the plant layout, the waste sand dump will be more than 2500 ft. long and about 800 ft. wide when the work is completed.

Below, left: Feeder which discharges to the conveyor. Right: View of conveyor tunnel, showing construction

Since the importance of having sufficient fine material in concrete, and of giving concrete sand a fairly uniform grading, began to be understood, a number of important plants have made changes in their flow sheets so that they can save the fine sand fraction and discard such proportions of the coarse and intermediate fractions as will give the sand a desirable grading. At the Grand Coulee plant this work is accomplished with a minimum of machinery, and the combination is made in a very definite way that can be accurately adjusted as the proportions of fine and coarse vary in the sand that is fed.

The sand (minus 4-mesh) in the deposit has a fineness modulus of 3.00 to 3.50, it is estimated, and the government specifications call for a fineness modulus between 2.50 and 3.00. The engineers found that for this sand a desirable grading would be: No. 4-20, 45% ; 20-48, 35%; and 48-100, 12½% to 17½%; with 2½% to 7½% passing 100-mesh.

The separation of the sand into fractions with these gradings, approximately, is made



Screens at the Grand Coulee plant

Below: "Lowering ladders" receiving screened gravel for stock piling

by three Dorr bowl classifiers. The first takes the feed from the conveyor (mentioned as coming from the chutes that receive the sand from the dewaterers) and removes a fraction that is nearly all 4 to 20-mesh. The next takes out the 20 to 48-mesh, and the third the 48-mesh and finer, except for the minus 100-mesh and finer, which is taken out in all the classifier overflows, as it is in the overflows of the sand dewaterers.

This type of classifier was chosen because it can be built to take large tonnages in a single unit and also because it can be adjusted to make close separations. The quantity of feed water is enough so that the overflow will carry nothing but 100-mesh and finer. But if this were the only adjustment there might be a considerable quantity of minus 100-mesh that would settle with the coarser sand and be held there with no means of washing it out. In the bowl classifier this may be prevented by using sufficient water in the discharge compartment so that there may be a rising current in the discharge opening. This will keep out unwanted fines and any clay that may be present. There are other adjustments, the height and speed of the arms and rakes, for example, so that the product may be controlled not only for general conditions but also for variations coming from changes in the feed.

The three classifier discharges fall on three belts that take them to separate drainage bins. These are of the "hillside" type; the bottoms are of open-joint tile through which the drained water flows off. Below these bins is a tunnel in which are five belt feeders, two each for the coarse and one for the fine fractions. The sand is fed to them through holes in the top of the tunnel, and the holes are always kept covered by a drag-line crane which runs on a track in front of the bins. This was designed and built on the job. Keeping the holes covered insures that the feeder belts will always be fully covered.

The feeder belts run under cutters that keep definite depths of sand on the belts. This roughly adjusts the proportions of each fraction, as the cutters may be raised and lowered. The fine adjustment is made by varying the speeds of the feeder belts which are driven by motors and Reeves variable speed drives. In this way the tonnage of each fraction, its percentage of the whole, may be very closely adjusted.

The feeder belts discharge to a belt conveyor that carries the fractions to two Jeffrey foundry sand mixers where they are thoroughly blended. Then the sand with a grading that is alike in every part, falls on a conveyor that takes it to a storage pile that is over the tunnel that houses the general reclamation and storage belt and the sand is sent to storage the same as the gravel products are.

This sand blending system is larger and perhaps somewhat more elaborate than would be needed by plants of more usual tonnage, but it contains two features which the writer believes should be a part of every such system, (1) a definite method of adjusting the amount of each fraction that is fed and (2) a mechanical device for mixing them.

Plant Water System

It is calculated that the plant will circulate about 20,000 gal. of water per min. when it is in full production. Only a small part of this will be fresh water from the river; the greater part will be water that has been used and cleaned of solids in the clarifiers.

Fresh water is pumped from the river by two Worthington, eight-stage centrifugal pumps, rated at 2500 g.p.m. each, and driven by 500 hp. Westinghouse motors. The total head at which the pumps must work is estimated at 670 ft. of which 604 ft. is static head. Space has been left to install another pump of 2500 g.p.m. capacity, if this should be necessary.

It is somewhat difficult to describe the connection of the fresh water and clarifier water systems without diagrams and a long description. Briefly the control of both is by variations in the head, and it is by differences in the head that fresh water is admitted to the clarifier water system to make up the loss caused by discharging wet material.

Fresh water is pumped to a 100,000-gal. equalizing tank in which there is a float that controls the pumps at the river through butterfly valves which partially choke the pump discharges.

The clarifier overflow goes to a 130,000-gal. tank from which it is pumped to the screen and classifier sprays and for water admitted with the feed. The discharge line runs beside the fresh water line to the screens and classifiers and the two are connected through a check valve, normally held closed by the head in the classifier line.

When the clarifier water gets a little low, the pumps begin to suck air (cavitate) and this lowers the pressure in the discharge line. Then the check valve opens and admits water until the head in the classifier line is enough to close the check valve. This valve then has the functions of making a head on both lines, providing make-up water and preventing the mixture of clarifier water with the fresh water in the circuit and in the 100,000-gal. tank.

This is a simple and automatic method of keeping both the head and the quantity of circulating water constant and it works perfectly.

There are three Dorr clarifier mechanisms. Two of them work in a tank with semi-circular ends, 250 ft. in its longest dimension and 125 ft. wide. The third is in a circular tank, 125 ft. in diameter.

The pumps for sludge and for the clarified overflow are in a house nearby. A box about 10 ft. square receives the sludge, and the three Kimball-Krogh pumps that pump it away are set on three sides of the box and close to it. This avoids the use of long suctions and suctions with bends that might clog. The pumps have 8-in. suctions and 6-in. discharges, and they are driven by Westinghouse induction motors and handle 600 tons per hour, 50% solids.

The clarifier overflows to three Worthington centrifugal pumps, each handling 6000 g.p.m. at full load. They are driven by Westinghouse synchronous motors.

At present the sludge goes to waste with 50% water. It is proposed to send it to the sand dewaterers, which have ample capacity, so part of this water may be saved, and experiments on this were in progress when the plant was visited. It was thought that this would work out all right because the sludge is practically nothing but fine sand and because all of it can be sent to waste with the discarded sand so that there would be no accumulation of this very fine stuff in the system.

Starting and Stopping

The starting and stopping of the different units of this plant is by a carefully worked out electrical system controlled from a central station. It is as nearly automatic as the nature of the machines will permit. The underlying principle is that no machine, or conveyor, shall receive any feed until it is running and ready to receive it. To this end the machines and conveyors are arranged in groups.

The switches and push buttons are in a house where an operator is constantly on duty. On a desk before him is a flat panel with colored push buttons by which the machines in the different groups may be stopped and started. The control goes all the way back to the primary feeders under the raw storage pile.

These, with the belt to the trommel belt feeders, make the first group. The second group includes these feeders and the belt, the trommels and the crusher. Stopping any one of these stops everything that precedes it. In the third group are the screens, the sand dewaterers, the classifiers and all the belts that convey their feeds and products to different machines and to storage, and the belt and stacker for waste sand. When this group, or any unit in it, is stopped there is no necessity to stop anything in the first and second groups because the balancing pile following the trommels and crusher will take care of their products.

Of course there are arrangements so that machines may be thrown out of their interlock for repair or other attention. And machines may be run independently to test them after they have been repaired or adjusted. The three classifiers are not interlocked in any group and they are started and stopped individually by an operator. It is easier to clean up the accumulated classifier discharge on a dead conveyor than it is to dig out a classifier that has stopped with a full load of sand.

The clarifier overflow and sludge pumps are controlled by their operator from a board in the pump house. The river pumps are controlled by hydraulically operated shut-off

valves in addition to the float control that has been described.

Conveying and Storing Finished Products

The reclamation conveyor that takes the finished products to the main storage starts in a tunnel which runs under the stock piles for the four gravel products and the blended sands, these piles being made by the products as they come from the plant. Under these piles are gates operated by compressed air, and the control is from the tripper at the main storage 6000 ft. away. A somewhat similar arrangement was used at the Boulder dam aggregates plant, but the gates were operated by motors which left the gates open on a dead belt when the power went off. With air operation and a receiver kept full of air this cannot happen.

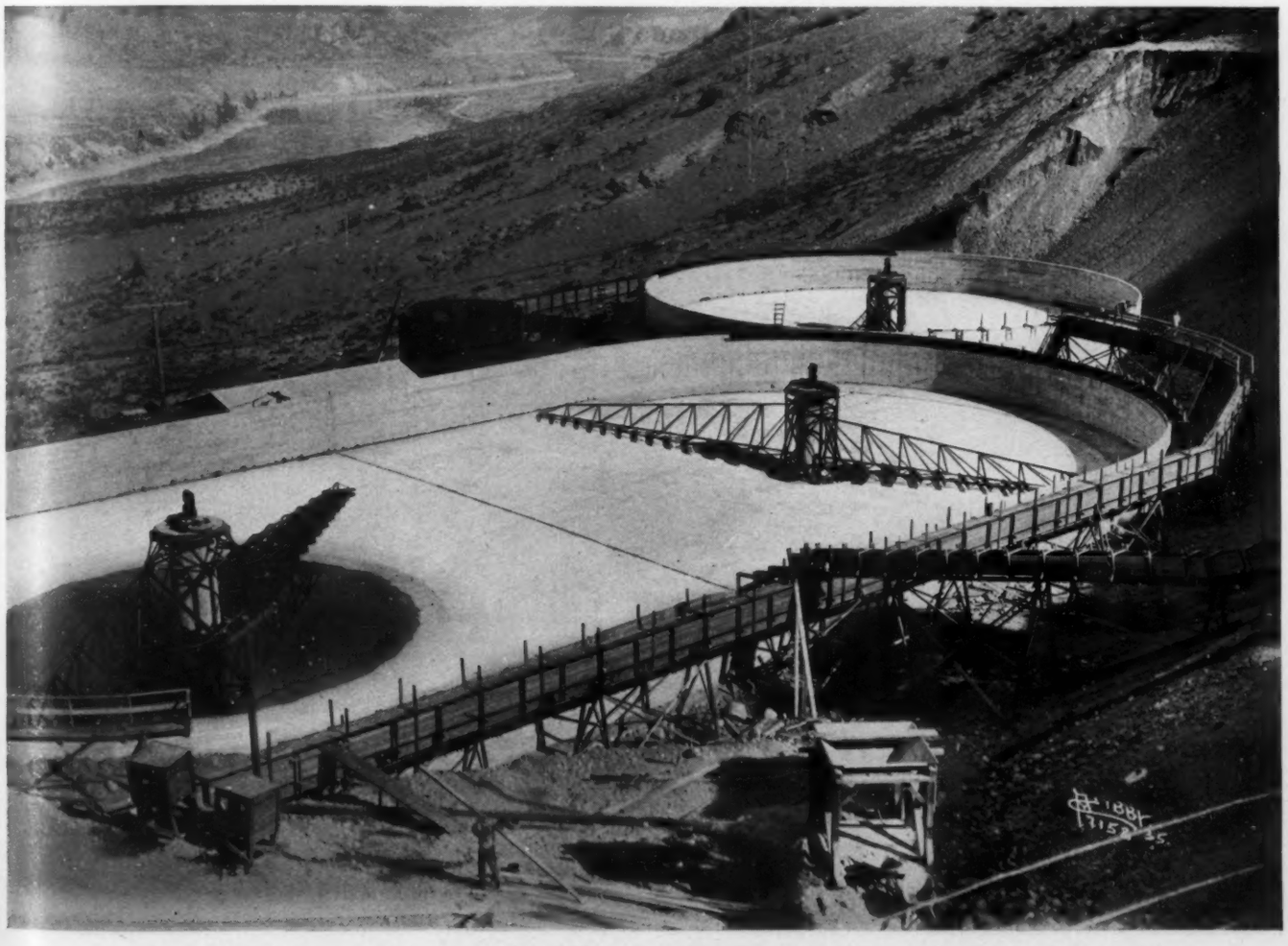
The conveyor from the plant to the main storage is divided into five sections, and the longest section is 2200 ft., centers. This is thought to be the longest single conveyor ever installed. It works perfectly under load. All the belts are 48-in. wide and the idlers are set 3 ft. 6-in., centers.

The last section has a tripper which discharges on cross belts that build stockpiles on a line parallel with the belt. Conveyors in tunnels under these stockpiles reclaim the materials and take them to conveyors that cross the river on a suspension bridge.

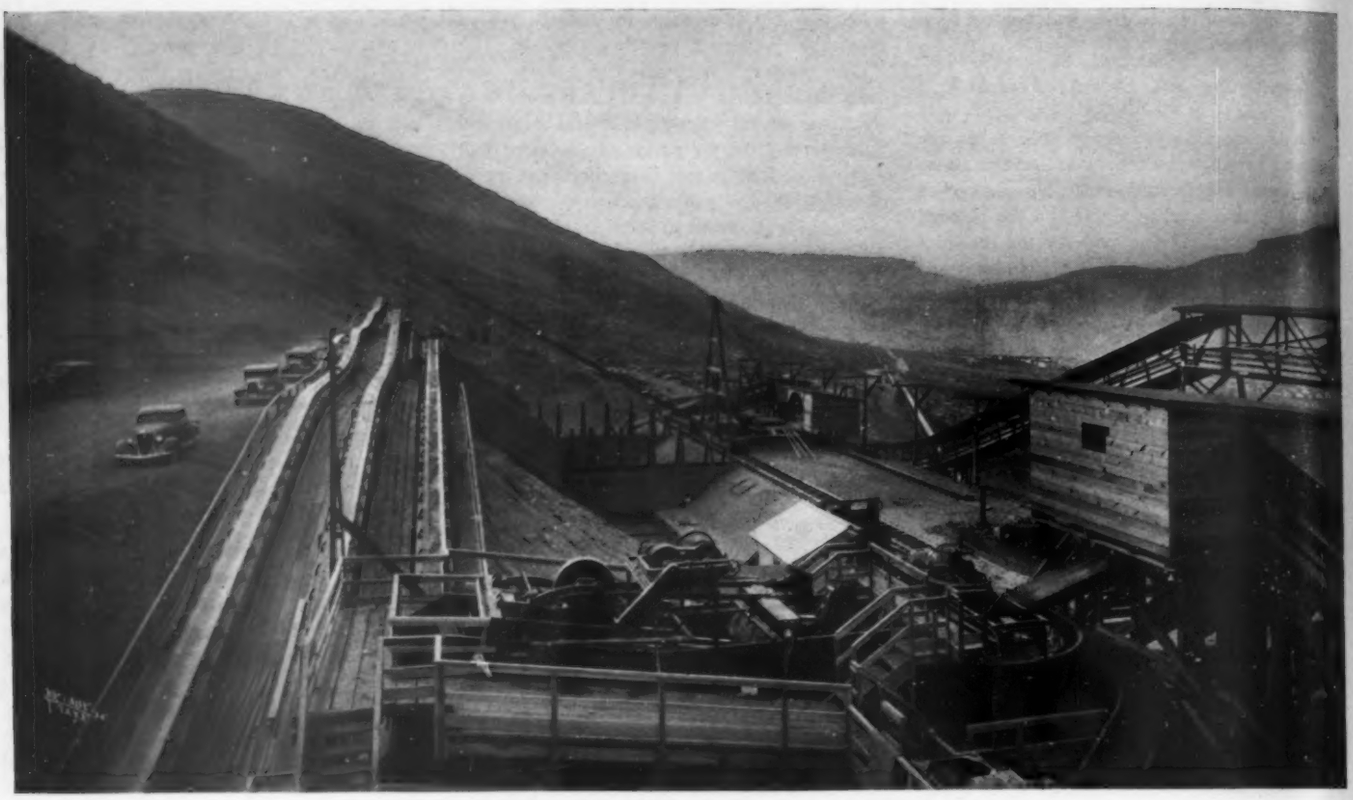
The tripper is a complete and very carefully designed machine, and much more than its name would imply. It moves back and forth on a track of 30 ft. gauge. The belt rises in a long slant to a discharge point about 30 ft. above the track level, and this is about 70 ft. above the tops of the tunnels, giving a considerable height for stockpiles. The belt discharge may be turned on to either of two cross belts, 75 ft. long, or be split between them. It is planned that there shall be four piles of gravel and one, much larger, of sand on each side of the belt, and that opposite piles shall be of the same sized products.

The tripper (they call it an "aeroplane" tripper because of its appearance) moves with its own power along the track so as to spot the cross belt discharges over the stockpiles. It has motors for driving the cross belts and for the winches by which the booms that support the cross belts may be raised and lowered. Near the discharge point is an operator's cab in which are all the controls. The most noticeable thing in this cab is a dial like a clock face, with the names of different products where the numbers would be on a clock. When the operator wishes to bring 6-in. to 3-in. gravel, say, to storage he turns a pointer like a clock hand to the 6-in. to 3-in. mark on the dial and pulls the knob. This energizes a solenoid air valve and opens the 6-in. to 3-in. material's gate. Pushing in the knob breaks the circuit and exhausts high pressure air from the cylinder. Low pressure air, always on the other side of the piston closes the gate. A contactor in the tunnel belt motor circuit also breaks the circuit and closes the gate if that motor stops. He cannot open a gate unless the storage conveyor is running, and two gates cannot be open at the same time. With normal operation the size called for will be at the tripper 12 minutes after the gate has been opened. Switches operated by each gate light or put out lights at the main control switch informing the operator of the completion of the gate movement.

Current for operating the tripper motors comes in through a cable which is hung in loops on a standing wire cable. There is also a 10-pair multiple cable that carries direct current from a motor generator set near the tripper to operate the solenoid air valves that open and close the gates, and there is a telephone circuit and the signal circuit that controls the lights when the gate is opened and closed.



System of clarifiers. Both the head and the quantity of the circulating water are kept constant



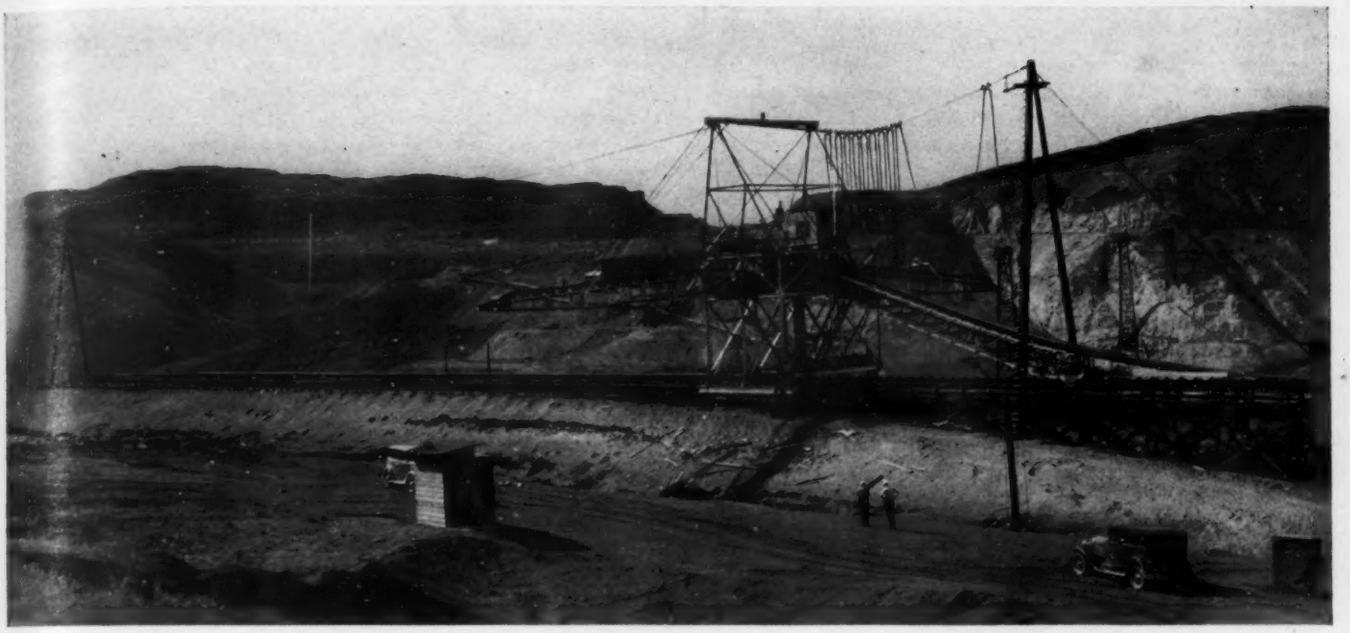
Coarse sand bowl classifier and sand drainage bins

A nice adjustment on the belts that bring the materials to storage was getting the belts of the different sections to drift the same distance after the power was shut off. If this was not done, the belt running faster would pile up material at the point where it was delivering to the next belt. The adjustment was made by brakes on those sections which it was judged would run faster when the conveying system was designed.

Some Conveyor Details

About the first thing that strikes the small plant operator, in looking at the pictures of this and similar large plants, is that they have a great many conveyors and that some of the conveyors are very long. A study of the layout shows that there are no superfluous conveyors and that there was no way of using shorter ones. Owing to the great tonnage the plant had to spread out horizontally a considerable distance to give room for stock piles, draining bins and other things. This made it necessary to put in conveyors

Close-up of sand drainage bins



Aeroplane tripper over storage

where in a little plant gravity chutes would probably have been used.

Nevertheless, it is somewhat astonishing to learn that there are 4½ miles of conveyors (not belts) in use in the plant and storages, the narrowest being 24-in. and the widest 60-in. Various makes of belt are used throughout the plant but whatever the make all the belts are best grade cover stock. A fair sample is one of the 42-in. belts which is 7-ply, of 28-oz. duck, having a cover strength of 4000 lb. per sq. in., with a 3/16-in. rubber cover.

All the conveyors are strongly supported and the idlers are set at 3 ft. 6 in. on some belts and at 2 ft. 6 in. on the heavier belts. There are 7300 idlers and all of them have Timken roller bearings. Everything about the conveyors but the belts was supplied by the Jeffrey Manufacturing Co.

There are some interesting details of feed and discharge arrangements. Where the feed goes down from the raw storage pile it has to turn and flow under a shelf of concrete to get to the opening above the feeders in the concrete chamber where they feed the 60-in. belt to the plant. This kills the velocity so that the largest pieces roll on to the feeders so gently that there is no serious shock. The openings through which the feed passes are protected with replaceable strips of manganese steel on the lips to take all the wear.

Where the discharge of the 60-in. belt is split between the two trommels there is a splitter of the "pants-leg" variety, which is so wide that it would be expensive and impractical to make a steel gate strong enough to stand the impact of the heavy feed. So "stop logs" were used. These are just lengths of timber cut the right length to hold in one of the legs and choke it off. They are inexpensive and it takes but a few minutes to place them.

The sand coming from the dewaterers falls into very wide chutes and has to be split between conveyors going to waste and to the classifiers, as has been explained. Owing to the width, there are four gates in each chute, each fitted with a diversion plate that is handled in a simple way, by reaching

Stacker for waste sand

through a hole in the chute. The discharge may be split—all, or half, or three-quarters or one-quarter to either conveyor.

There are many details of this kind that one will notice in going through the plant which have been found necessary on account of the heavy tonnage handled, so heavy that ordinary methods could not be used.

Conclusions

Owing to his long years of studying and writing about sand and gravel operations, the writer is very glad that he has been able to study this, the greatest of them all. It is big but it is nowhere too big; indeed when one thinks of such a tonnage as 2500 tons per hour the screens and classifiers look rather small. But both theory and experience has shown that they are large enough to do the work. Everything about the plant shows sound engineering, the application of tried and proved methods and machines to conditions of tonnage and of handling materials which are far beyond the usual. This plant shows that you cannot take a small plant design and enlarge it like a photograph and build a satisfactory large plant. The differences are fundamental, and the design must start with the beginning and carry through all the way. The plant cost per ton will be low.

CONVEYOR EQUIPMENT SCHEDULE
PIT & GRAVEL CONVEYORS FOR GRAND COULEE DAM SAND & GRAVEL PLANT

PIT CONVEYORS	WIDTH	LENGTH	LIFT	LOAD T.P.H.	LOAD SIZE	SPEED	HORSE POWER REQ'D	HORSE POWER MOTOR	DRIVE MACHINERY: LOCATION OF DRIVE	TYPE	DRIVE PULLEY	DRIVE R.P.M.	SCREW TAKE UP PULLEY	SCREW TAKE UP TRAVEL	SNUB	IDLER SPAC'G TR'GH'G	IDLER SPAC'G RET'N	BELT PLIES	BELT DUCK
#1 CROSS CONVEYOR	60"	1000'	-10'	2500	-16"	400'	107	125-870	HEAD	SINGLE LAG'D	42"x4 1/2"	36.5	32"x3 1/2"	48"	24"x2 1/2"	2'-6"	10'	8	28oz
#2 LONGITUDINAL SO.	42"	650'	19'	1250	-16"	382'	65	125-870	HEAD	SINGLE LAG'D	36"x4 1/2"	40.3	24"x3 1/2"	36"	20"x2 1/2"	2'-6"	10'	7	28oz
#3 LONGITUDINAL SO.	42"	650'	19'	1250	-16"	382'	65	125-870	HEAD	SINGLE LAG'D	36"x4 1/2"	40.3	24"x3 1/2"	36"	20"x2 1/2"	2'-6"	10'	7	28oz
#4 LONGITUDINAL NOR.	42"	1600'	-25'	1250	-16"	382'	65	125-870	HEAD	SINGLE LAG'D	36"x4 1/2"	40.3	24"x3 1/2"	48"	20"x2 1/2"	2'-6"	10'	7	28oz
#5 BOOM SOUTH	42"	195'	20'	1250	-16"	382'	43	75-870	HEAD	SINGLE LAG'D	36"x4 1/2"	40.3	20"x3 1/2"	24"	20"x2 1/2"	2'-6"	10'	7	28oz
#6 BOOM NORTH	42"	195'	16'	1250	-16"	382'	38	75-870	HEAD	SINGLE LAG'D	36"x4 1/2"	40.3	20"x3 1/2"	24"	20"x2 1/2"	2'-6"	10'	7	28oz
PLANT CONVEYORS																			
A BET'W'N DUMP & SCR'S.	60"	3 165'	5.75'	2500	-16"	400	28	50-870	HEAD	SINGLE BARE	42"x4 1/2"	36.5	32"x3 1/2"	24"	24"x2 1/2"	2'-6"	10'	8	28oz
B BET'W'N SCR'S & BAL. PILE	48"	3 146'	0'	2500	-6"	500	24	30-870	TAIL	SINGLE LAG	36"x4 1/2"	53	24"x3 1/2"	36"	20"x2 1/2"	2'-6"	10'	7	32oz
C BET'W'N BAL. PILE & SC. N'SE	42"	3 243'	-1'	1250	-6"	396	7	25-700 G.M.	HEAD	SINGLE BARE	36"x4 1/2"	41.8	24"x3 1/2"	24"	20"x2 1/2"	3'-4"	10'	7	28oz
D BET'W'N BAL PILE & SC. N'SE	42"	3 243'	-1'	1250	-6"	396	17	25-700 G.M.	HEAD	SINGLE BARE	36"x4 1/2"	41.8	24"x3 1/2"	24"	20"x2 1/2"	3'-4"	10'	7	28oz
E IN SCREEN HOUSE	24"	3 64'	0'	120	-1 1/2"+3/4"	250	1	5 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
F IN SCREEN HOUSE	24"	3 130'	12'	120	-3/4"+4	250	3.5	5 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
G IN SCREEN HOUSE	24"	3 66'	0'	240	-3"+1 1/2"	250	2	5 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
H IN SCREEN HOUSE	24"	3 138'	0'	240	-6"+3"	250	3	5 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
J IN SCREEN HOUSE	24"	3 130'	12'	120	-3/4"+4	250	3.5	5 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
K IN SCREEN HOUSE	24"	3 64'	0'	120	-1 1/2"+3/4"	250	1	5 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
L RET'N SCR. H. & STOCK P.	24"	3 156'	15'	240	-6"+3"	250	7	10 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
M BET'W'N SCR. H. & STOCK P.	24"	3 175'	15'	240	-1 1/2"+3/4"	250	7	10 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
N RET'N SCR. H. & STOCK P.	24"	3 162'	15'	240	-3"+1 1/2"	250	7	10 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
O RET'N SCR. H. & STOCK P.	24"	3 171'	15'	240	-3/4"+4	250	7	10 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz

AGGREGATE CONVEYORS PLANT STORAGE TO MIXER STORAGE

CONV. NO.	LOCATION DESCRIPT.	WIDTH	LENGTH	LIFT	LOAD T.P.H.	LOAD SIZE	SPEED	HORSE POWER REQ'D	HORSE POWER MOTOR	DRIVE MACHINERY: LOCATION OF DRIVE	TYPE	DRIVE PULLEY	DRIVE R.P.M.	SCREW TAKE UP PULLEY	SCREW TAKE UP TRAVEL	SNUB	IDLER SPAC'G TR'GH'G	IDLER SPAC'G RET'N	BELT PLIES	BELT DUCK
	AGGREGATE CONVEYORS PLANT STORAGE TO MIXER STORAGE																			
1-A	PLANT STORAGE TUN'L	42"	440	5'	1200	TO 6"	380	45	125	HEAD	GEAR	36"-4 1/2"	40 1/2	24"-3 1/2"	48"	20"-2 1/2"	3'-0"	10"	7	28oz
1-B	TO MIXER STORAGE	48"	3157	-101'	1200	TO 6"	380	45/75	125	TAIL	GEAR	36"-4 1/2"	40 1/2	24"-3 1/2"	48"	20"-2 1/2"	VARIES	VARIES	7	32 oz
1-C	TO MIXER STORAGE	48"	1715	-29'	1200	TO 6"	380	75/75	125	HEAD	GEAR	36"-4 1/2"	40 1/2	24"-3 1/2"	48"	20"-2 1/2"	VARIES	VARIES	7	32 oz
1-D	TO MIXER STORAGE	48"	1068	-51'	1200	TO 6"	380	75/-31	125	TAIL	GEAR	36"-4 1/2"	40 1/2	SPECIAL 32"-4 1/2"	48"	20"-2 1/2"	VARIES	VARIES	7	32 oz
1-E	TRIPPER CONV.	42"	629	32'	1200	TO 6"	380	90	125	TANDM.	GEAR	36"-4 1/2"	40 1/2	24"-3 1/2"	48"	20"-2 1/2"	3'-	10'	7	32 oz
2-A	TRIPPER BOOM	42"	75	23'	1200	TO 6"	400	38	40	TAIL	G.M.	32"-4 1/2"	55 1/2	24"-3 1/2"	24"	NONE	3'-4"	10'	7	28 oz
2-B	TRIPPER BOOM	42"	75	23'	1200	TO 6"	400	38	40	TAIL	G. M.	32"-4 1/2"	55 1/2	24"-3 1/2"	24"	NONE	3'-4"	10'	7	28 oz

SAND AND SPOIL CONVEYORS

CONV. NO.	LOCATION DESCRIPT	WIDTH	LENGTH	LIFT	LOAD T.P.H.	LOAD SIZE	SPEED	HORSE POWER REQ'D	HORSE POWER MOTOR	DRIVE MACHINERY: LOCATION OF DRIVE	TYPE	DRIVE PULLEY	DRIVE R.P.M.	SCREW TAKE UP PULLEY	SCREW TAKE UP TRAVEL	SNUB	IDLER SPAC'G TR'GH'G	IDLER SPAC'G RET'N	BELT PLIES	BELT DUCK
	SAND HANDLING CONVEYORS																			
P	FEED TO CLASSIFIERS	36"	227'	24'	600	SAND	525	26.1	40	HEAD	G.M.	30"-3 1/2"	59.3	24"-2 1/2"	30"	H.V. DUTY RET'N	4'-0"	10'-0"	6	28oz
Q	TO DRAIN. BINS #1-#20	24"	190'	25'	150	SAND	375	TRIPPER 12.0	25	HEAD	G.M.	24"-3 1/2"	60.6	20"-2 1/2"	30"	HV. DUTY RET'N	4'-6"	10'-0"	5	28oz
R	TO DRAIN. BINS #20-#48	24"	274'	96.33'	116	SAND	375	TRIPPER 13.5	25	HEAD	G.M.	24"-3 1/2"	60.6	20"-2 1/2"	36"	HV. DUTY RET'N	4'-6"	10'-0"	5	28oz
S	TO DRAIN. BINS #48-#100	24"	349	45.5'	66	SAND	375	TRIPPER 15.0	25	HEAD	G.M.	24"-3 1/2"	60.6	20"-2 1/2"	36"	HV. DUTY RET'N	4'-6"	10'-0"	5	28oz
X	IN DRAINAGE TUNNEL	36"	185	-0.87'	300	SAND	250	41	10	HEAD	G.M.	30"-3 1/2"	31 1/2	24"-2 1/2"	30"	HV. DUTY RET'N	4'-0"	10'-0"	6	28oz
Y	TUNNEL TO AERATORS	36"	81'	27'	300	SAND	250	10.4	15	HEAD	G.M.	30"-3 1/2"	31 1/2	24"-2 1/2"	30"	HV. DUTY RET'N	4'-0"	10'-0"	6	28oz
Z	AERATORS TO STOR.	36"	310'	42.75'	300	SAND	250	TRIPPER 21.1	30	HEAD	G.M.	30"-3 1/2"	31 1/2	24"-2 1/2"	30"	HV. DUTY RET'N	4'-0"	10'-0"	6	28oz
	SPOIL HANDLING CONVEYORS																			
T	FROM CLASSIFIERS	24"	105'	6'	300	SAND	350	4.3	10	HEAD	G.M.	24"-2 1/2"	55 1/2	20"-2 1/2"	24"	HV. DUTY RET'N	4'-6"	10'-0"	5	28oz
U	CROSS CONV.	24"	58'	9'	300	SAND	350	3.9	10	HEAD	G.M.	24"-2 1/2"	55 1/2	20"-2 1/2"	24"	HV. DUTY RET'N	4'-6"	10'-0"	5	28oz
V	UNDER DEWATERERS	42"	155'	0'	1800	SAND	600	33	30	HEAD	GEAR	36"-4 1/2"	63 1/2	24"-3 1/2"	36"	20"-2 1/2"	2'-9"	10'-0"	7	28oz
W	TO STACKER	42"	193'	3	1800	SAND	600	25	30	HEAD	GEAR	36"-4 1/2"	63 1/2	24"-3 1/2"	30"	20"-2 1/2"	2'-9"	10'-0"	7	28oz
W1	EXTENSION	42"	400	25'	1800	SAND	600	102	125	HEAD	GEAR	36"-4 1/2"	63 1/2	24"-3 1/2"	36"	20"-2 1/2"	2'-9"	7'-0"	7	32oz
M2	STACKER EXT. SEC.	48"	465	27	1800	SAND	500	112	125	HEAD	GEAR	36"-5 1/2"	53	24"-3 1/2"	36"	20"-3 1/2"	3'-6"	7'-0"	7	42oz
N2	STACKER TEL. SEC.	48"	144	21	1800	SAND	500	63	100	HEAD	CHAIN	36"-4 1/2"	53	24"-3 1/2"	36"	HV. DUTY. RET'N	3'-0" 3'-6"	10'-0"	7	32oz
O-2	STACKER BOOM SEC.	48"	150	10	1800	SAND	500	46	75	INTERNAL	GEAR	32"-4 1/2"	53	24"-3 1/2"	36"	32"-4 1/2"	3'-6"	4'-6"	7	32oz

The builders are the Mason-Walsh-Atkinson-Kier Co., composed of men who have had much experience in large contracts of this kind. The design and the construction were directly under the supervision of C. D. Riddle, job engineer. Mr. Riddle recently designed the aggregate plant at the Norris dam, in Tennessee, a somewhat unusual and very successful plant.

The actual designing in detail was done by G. F. Dodge, one of the Jeffrey Manufacturing Co.'s engineers, who was loaned to the company for this job. He was assisted by Robert Matthews, a specialist in the design and construction of conveying and elevating machinery.

It would be ungenerous to finish this story without saying a word or two about the camp, or rather town, of Mason City, where life is so comfortable. To an old timer who remembers what construction and mining camps were like not so very long ago, the difference is almost incredible. Instead of rough shacks here are neat and well-built houses which are rented to married men at what is reasonable rent when the amortization is considered. Administration building, hospital and school house are large, well built and good architecturally. The hotel and restaurant are excellent and one can live in them as cheaply as in similar places in a good sized town and be rather more comfortable. There is a good sized recreation hall for the employes to use for playing pool and other games, reading the papers and talking with their friends. Beer and soft drinks are the only beverages sold.

There is no more pleasant aspect of industry today than the way the safety, health and comfort of employes are looked after by the large employers of labor, and Mason City is as good an example of this as one counld wish to see. The effect in increased self-respect is showing plainly on the men who work in such places. The big "husky" is there to take the brunt of the work as he always has been, and one hopes he always will be, but the "roughneck" is hardly to be seen any more.

Sand Classification at Grand Coulee Dam

(Review by Edmund Shaw)

AT THE RECENT MEETING of the American Institute of Mining Engineers, Anthony Anable, engineer of the Dorr Co., gave a paper, and showed moving pictures of, "The Preparation of High Specification Concrete Sand at the Grand Coulee Dam." Extracts of the paper, supplementing the preceding article on the plant, follow:

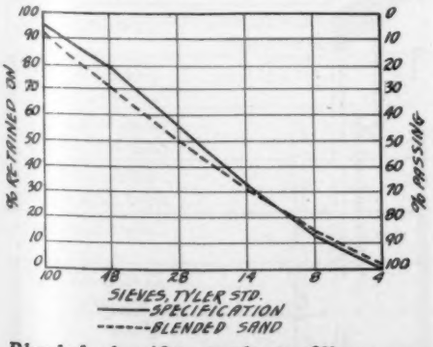
"At Boulder dam, and to an even greater degree at Grand Coulee dam, sand production is recognized as probably the most important single element affecting the physical characteristics of the concrete. . . . The government specification calls for the segregation of the pit run material into four sizes of gravel and a single, blended, concrete sand, for which the specification is: *Concrete Sand.* Fineness modulus, 2.5-3.0, and having a screen analysis approximating the following:

PER CENT RETAINED ON SIEVES

Mesh	4	8	14	28	48	100	—100
% by Wt.	—	12	20	24	24	15	5
Cum. %, Wt.	—	12	32	56	80	95	

"The fineness modulus is the sum of the lower row of figures divided by 100, and this is 2.75.

"To produce the required amount of aggregates, it was calculated that there would be required 278 tons per hour of blended sand . . . and that from 400-600 tons raw sand would be required to yield this." (A description of the classifying plant follows, but as this is described elsewhere, only the figures showing the work of the classifiers will be given.)



Blended classifier products fill government specification

Coarse Classifier. Feed, 400-600 tons per hr.; sand discharge, 250 tons per hr.; sand in overflow, 250 tons per hr.

PER CENT RETAINED ON SIEVES

Mesh	4	8	14	28	48	100	—100
% by Wt.	1	22	27	27	17	5	1
Cum. %, Wt.	1	23	50	77	94	99	

(Fineness modulus, 3.44)

Intermediate Classifier. The feed for this is the 250 tons per hr. of overflow of the coarse classifier. Sand discharge, 90 tons per hr.; sand in overflow, 180 tons per hr.

PER CENT RETAINED ON SIEVES

Mesh	4	8	14	28	48	100	—100
% by Wt.	—	—	3	15	44	38	0
Cum. %, Wt.	—	—	3	18	62	100	

(Fineness modulus, 1.83)

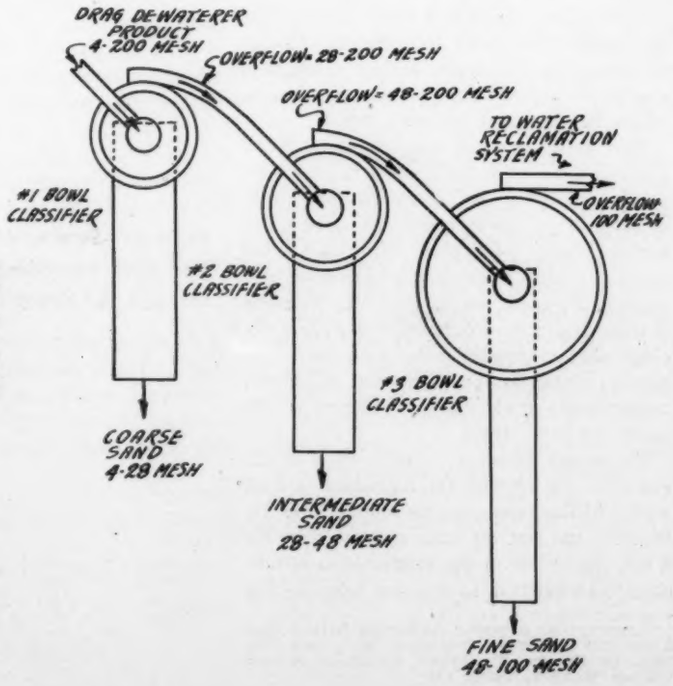
Fine Classifier. Feed, 180 tons per hr.; overflow from intermediate classifier. Sand discharge, 90 tons per hr.; overflow sand, 90 tons per hr.

PER CENT RETAINED ON SIEVES

Mesh	4	8	14	28	48	100	200	—200
% by Wt.	—	—	—	1	6	60	31	2
Cum. %, Wt.	—	—	—	1	7	67	98	

(Fineness modulus, 0.75)

The following table, taken from the paper, gives a summary of the work. It shows that the three classifier products, blended in the proportions in which they are made, form a concrete sand which fills the Government's specification, fineness modulus between 2.5 and 3.0 and a grading corresponding closely to that given. To show this the reviewer has plotted the Government's curve and the curve of the grading shown in the accompanying table:



Diagrammatic sketch of the arrangement of the three sand classifiers at the Grand Coulee dam aggregates plant

through a hole in the chute. The discharge may be split—all, or half, or three-quarters or one-quarter to either conveyor.

There are many details of this kind that one will notice in going through the plant which have been found necessary on account of the heavy tonnage handled, so heavy that ordinary methods could not be used.

Conclusions

Owing to his long years of studying and writing about sand and gravel operations, the writer is very glad that he has been able to study this, the greatest of them all. It is big but it is nowhere too big; indeed when one thinks of such a tonnage as 2500 tons per hour the screens and classifiers look rather small. But both theory and experience has shown that they are large enough to do the work. Everything about the plant shows sound engineering, the application of tried and proved methods and machines to conditions of tonnage and of handling materials which are far beyond the usual. This plant shows that you cannot take a small plant design and enlarge it like a photograph and build a satisfactory large plant. The differences are fundamental, and the design must start with the beginning and carry through all the way. The plant cost per ton will be low.

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PIT & GRAVEL CONVEYORS FOR GRAND COULEE DAM SAND & GRAVEL PLANT

PIT CONVEYORS	WIDTH	LENGTH	LIFT	LOAD T.P.H.	LOAD SIZE	SPEED	HORSE POWER REQD	HORSE POWER MOTOR	DRIVE MACHINERY: LOCATION OF DRIVE	TYPE	DRIVE PULLEY	DRIVE R.P.M.	SCREW TAKE UP PULLEY	SCREW TAKE UP TRAVEL	SNUB	IDLER SPAC'G TRG'G	IDLER SPAC'G RET'N	BELT PLIES	BELT DUCK
*1 CROSS CONVEYOR	60"	1000'	-10'	2500	-16"	400'	107	125-870	HEAD	SINGLE LAG'D	42"x4 15/16"	36.5	32"x3 1/2"	48"	24"x2 1/2"	2'-6"	10'	8	28oz
*2 LONGITUDINAL SO.	42"	650'	19'	1250	-16"	382'	65	125-870	HEAD	SINGLE LAG'D	36"x4 15/16"	40.3	24"x3 1/2"	36"	20"x2 1/2"	2'-6"	10'	7	28oz
*3 LONGITUDINAL SO.	42"	650'	19'	1250	-16"	382'	65	125-870	HEAD	SINGLE LAG'D	36"x4 15/16"	40.3	24"x3 1/2"	36"	20"x2 1/2"	2'-6"	10'	7	28oz
*4 LONGITUDINAL WOR.	42"	1600'	-25'	1250	-16"	382'	65	125-870	HEAD	SINGLE LAG'D	36"x4 15/16"	40.3	24"x3 1/2"	48"	20"x2 1/2"	2'-6"	10'	7	28oz
*5 BOOM SOUTH	42"	195'	20'	1250	-16"	382'	43	75-870	HEAD	SINGLE LAG'D	36"x4 15/16"	40.3	20"x3 1/2"	24"	20"x2 1/2"	2'-6"	10'	7	28oz
*6 BOOM NORTH	42"	195'	16'	1250	-16"	382'	38	75-870	HEAD	SINGLE LAG'D	36"x4 15/16"	40.3	20"x3 1/2"	24"	20"x2 1/2"	2'-6"	10'	7	28oz
PLANT CONVEYORS																			
A BETW'N DUMP & SCR'S.	60"	3 165'	5.75'	2500	-16"	400	28	50-870	HEAD	SINGLE BARE	42"x4 15/16"	36.5	32"x3 1/2"	24"	24"x2 1/2"	2'-6"	10'	8	28oz
B BETW'N SCR'S & BAL. PILE	48"	3 146'	0'	2500	-6"	500	24	30-870	TAIL	SINGLE LAG	36"x4 15/16"	53	24"x3 1/2"	36"	20"x2 1/2"	2'-6"	10'	7	32oz
C BETW'N BAL. PILE & SC. NSE.	42"	3 243'	-1'	1250	-6"	396	7	25-709 GM	HEAD	SINGLE BARE	36"x4 15/16"	41.8	24"x3 1/2"	24"	20"x2 1/2"	3'-4"	10'	7	28oz
D BETW'N BAL PILE & SC. NSE	42"	3 243'	-1'	1250	-6"	396	17	25-709 GM	HEAD	SINGLE BARE	36"x4 15/16"	41.8	24"x3 1/2"	24"	20"x2 1/2"	3'-4"	10'	7	28oz
E IN SCREEN HOUSE	24"	3 64'	0'	120	-1 1/2"+3/4"	250	1	5 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	N.D. RET. IDLER	4'-6"	10'	5	28oz
F IN SCREEN HOUSE	24"	3 130'	12'	120	-3/4"+#4	250	3.5	5 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
G IN SCREEN HOUSE	24"	3 66'	0'	240	-3"+1 1/2"	250	2	5 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
H IN SCREEN HOUSE	24"	3 138'	0'	240	-6"+3"	250	3	5 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
J IN SCREEN HOUSE	24"	3 130'	12'	120	-3/4"+#4	250	3.5	5 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
K IN SCREEN HOUSE	24"	3 64'	0'	120	-1 1/2"+3/4"	250	1	5 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
L BETW'N SCR. H. & STOCK P.	24"	3 156'	15'	240	-6"+3"	250	7	10 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
M BETW'N SCR. H. & STOCK P.	24"	3 175'	15'	240	-1 1/2"+3/4"	250	7	10 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
N BETW'N SCR. H. & STOCK P.	24"	3 162'	15'	240	-3"+1 1/2"	250	7	10 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz
O BETW'N SCR. H. & STOCK P.	24"	3 171'	15'	240	-3/4"+#4	250	7	10 GEAR M.	HEAD	SINGLE BARE	24"x2 1/2"	39.8	20"x1 1/2"	24"	H.D. RET. IDLER	4'-6"	10'	5	28oz

AGGREGATE CONVEYORS PLANT STORAGE TO MIXER STORAGE

CONV. NO.	LOCATION DESCRIPT.	WIDTH	LENGTH	LIFT	LOAD T.P.H.	LOAD SIZE	SPEED	HORSE POWER REQD	HORSE POWER MOTOR	DRIVE MACHINERY: LOCATION OF DRIVE	TYPE	DRIVE PULLEY	DRIVE R.P.M.	SCREW TAKE UP PULLEY	SCREW TAKE UP TRAVEL	SNUB	IDLER SPAC'G TRG'G	IDLER SPAC'G RET'N	BELT PLIES	BELT DUCK
	AGGREGATE CONVEYORS PLANT STORAGE TO MIXER STORAGE																			
1-A	PLANT STORAGE TUN'L	42"	440	5'	1200	TO 6"	380	45	125	HEAD	GEAR	36"-4 15/16	40 1/2	24"-3 1/2	48"	20"-2 1/2"	3'-0"	10'	7	28oz
1-B	TO MIXER STORAGE	48"	2157	-101'	1200	TO 6"	380	125	125	TAIL	GEAR	36"-4 15/16	40 1/2	24"-3 1/2	48"	20"-2 1/2"	VARIES	VARIES	7	32 oz
1-C	TO MIXER STORAGE	48"	1715	-29'	1200	TO 6"	380	3/8	125	HEAD	GEAR	36"-4 15/16	40 1/2	24"-3 1/2	48"	20"-2 1/2"	VARIES	VARIES	7	32 oz
1-D	TO MIXER STORAGE	48"	1068	-51"	1200	TO 6"	380	3/8	125	TAIL	GEAR	36"-4 15/16	40 1/2	SPECIAL 32-4 1/2	48"	20"-2 1/2"	VARIES	VARIES	7	32 oz
1-E	TRIPPER CONV.	42"	629	32'	1200	TO 6"	380	90	125	TANDM.	GEAR	36"-4 15/16	40 1/2	24"-3 1/2	48"	20"-2 1/2"	3'-	10'	7	32 oz
2-A	TRIPPER BOOM	42"	75	23'	1200	TO 6"	400	38	40	TAIL	G.M.	32"-4 1/2	55 1/2	24"-3 1/2	24"	NONE	3'-4"	10'	7	28 oz
2-B	TRIPPER BOOM	42"	75	23'	1200	TO 6"	400	38	40	TAIL	G.M.	32"-4 1/2	55 1/2	24"-3 1/2	24"	NONE	3'-4"	10'	7	28 oz

SAND AND SPOIL CONVEYORS

CONV. NO.	LOCATION DESCRIPT	WIDTH	LENGTH	LIFT	LOAD T.P.H.	LOAD SIZE	SPEED	HORSE POWER REQD	HORSE POWER MOTOR	DRIVE MACHINERY: LOCATION OF DRIVE	TYPE	DRIVE PULLEY	DRIVE R.P.M.	SCREW TAKE UP PULLEY	SCREW TAKE UP TRAVEL	SNUB	IDLER SPAC'G TRG'G	IDLER SPAC'G RET'N	BELT PLIES	BELT DUCK
	SAND HANDLING CONVEYORS																			
P	FEED TO CLASSIFIERS	36"	227'	24'	600	SAND	525	*26.1	40	HEAD	G.M.	30"-3 1/2	59.3	24"-2 1/2	30"	HY. DUTY RET'N	4'-0"	10'-0"	6	28oz
Q	TO DRAIN. BINS #4-#20	24"	190'	25'	150	SAND	375	*TRIPPER 12.5	25	HEAD	G.M.	24"-3 1/2	60.6	20"-2 1/2	30"	HY. DUTY RET'N	4'-6"	10'-0"	5	28oz
R	TO DRAIN. BINS #20-#48	24"	274	36.33'	116	SAND	375	*TRIPPER 12.5	25	HEAD	G.M.	24"-3 1/2	60.6	20"-2 1/2	36"	HY. DUTY RET'N	4'-6"	10'-0"	5	28oz
S	TO DRAIN. BINS #48-100	24"	344	45.5'	66	SAND	375	*TRIPPER 15.0	25	HEAD	G.M.	24"-3 1/2	60.6	20"-2 1/2	36"	HY. DUTY RET'N	4'-6"	10'-0"	5	28oz
X	IN DRAINAGE TUNNEL	36"	185'	-0.87'	300	SAND	250	4.1	10	HEAD	G.M.	30"-3 1/2	31.8	24"-2 1/2	30"	HY. DUTY RET'N	4'-0"	10'-0"	6	28oz
Y	TUNNEL TO AERATORS	36"	81'	27'	300	SAND	250	10.4	15	HEAD	G.M.	30"-3 1/2	31.8	24"-2 1/2	30"	HY. DUTY RET'N	4'-0"	10'-0"	6	28oz
Z	AERATORS TO STOR.	36"	310'	42.75'	300	SAND	250	*TRIPPER 21.1	30	HEAD	G.M.	30"-3 1/2	31.8	24"-2 1/2	30"	HY. DUTY RET'N	4'-0"	10'-0"	6	28oz
	SPOIL HANDLING CONVEYORS																			
T	FROM CLASSIFIERS	24"	105'	6'	300	SAND	350	4.3	10	HEAD	G.M.	24"-2 1/2	55.8	20"-2 1/2	24"	HY. DUTY RET'N	4'-6"	10'-0"	5	28oz
U	CROSS CONV.	24"	58'	9'	300	SAND	350	3.9	10	HEAD	G.M.	24"-2 1/2	55.8	20"-2 1/2	24"	HY. DUTY RET'N	4'-6"	10'-0"	5	28oz
V	UNDER DEWATERERS	42"	155'	0'	1800	SAND	600	33	30	HEAD	GEAR	36"-4 15/16	63 11/16	24"-3 1/2	36"	20-2 1/2"	2'-9"	10'-0"	7	28oz
W	TO STACKER	42"	193'	3	1800	SAND	600	25	30	HEAD	GEAR	36"-4 15/16	63 11/16	24"-3 1/2	30"	20-2 1/2"	2'-9"	10'-0"	7	28oz
W-1	EXTENSION	42"	400	25'	1800	SAND	600	102	125	HEAD	GEAR	36"-4 15/16	63 11/16	24"-3 1/2	36"	20-2 1/2"	2'-9"	7'-0"	7	32oz
W-2	STACKER EXT. SEC.	48"	465	27	1800	SAND	500	112	125	HEAD	GEAR	36"-5 15/16	53	24"-3 1/2	36"	20"-3 1/2"	3'-6"	7'-0"	7	42oz
W-2	STACKER TEL. SEC.	48"	144	21	1800	SAND	500	63	100	HEAD	CHAIN	36"-4 1/2	53	24"-3 1/2	36"	HY. DUTY RET'N	3'-0" 3'-6"	10'-0"	7	32oz
O-2	STACKER BOOM SEC.	48"	150	10	1800	SAND	500	46	75	INTERNAL	GEAR	32"-4 1/2	53	24"-3 1/2	36"	32"-4 1/2	3'-6"	4'-6"	7	32oz

The builders are the Mason-Walsh-Atkinson-Kier Co., composed of men who have had much experience in large contracts of this kind. The design and the construction were directly under the supervision of C. D. Riddle, job engineer. Mr. Riddle recently designed the aggregate plant at the Norris dam, in Tennessee, a somewhat unusual and very successful plant.

The actual designing in detail was done by G. F. Dodge, one of the Jeffrey Manufacturing Co.'s engineers, who was loaned to the company for this job. He was assisted by Robert Matthews, a specialist in the design and construction of conveying and elevating machinery.

It would be ungenerous to finish this story without saying a word or two about the camp, or rather town, of Mason City, where life is so comfortable. To an old timer who remembers what construction and mining camps were like not so very long ago, the difference is almost incredible. Instead of rough shacks here are neat and well-built houses which are rented to married men at what is reasonable rent when the amortization is considered. Administration building, hospital and school house are large, well built and good architecturally. The hotel and restaurant are excellent and one can live in them as cheaply as in similar places in a good sized town and be rather more comfortable. There is a good sized recreation hall for the employes to use for playing pool and other games, reading the papers and talking with their friends. Beer and soft drinks are the only beverages sold.

There is no more pleasant aspect of industry today than the way the safety, health and comfort of employes are looked after by the large employers of labor, and Mason City is as good an example of this as one counld wish to see. The effect in increased self-respect is showing plainly on the men who work in such places. The big "husky" is there to take the brunt of the work as he always has been, and one hopes he always will be, but the "roughneck" is hardly to be seen any more.

Sand Classification at Grand Coulee Dam

(Review by Edmund Shaw)

AT THE RECENT MEETING of the American Institute of Mining Engineers, Anthony Anable, engineer of the Dorr Co., gave a paper, and showed moving pictures of, "The Preparation of High Specification Concrete Sand at the Grand Coulee Dam." Extracts of the paper, supplementing the preceding article on the plant, follow:

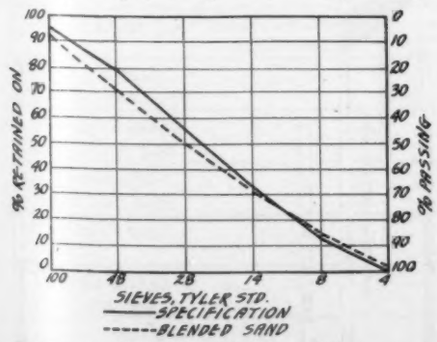
"At Boulder dam, and to an even greater degree at Grand Coulee dam, sand production is recognized as probably the most important single element affecting the physical characteristics of the concrete. . . . The government specification calls for the segregation of the pit run material into four sizes of gravel and a single, blended, concrete sand, for which the specification is: *Concrete Sand.* Fineness modulus, 2.5-3.0, and having a screen analysis approximating the following:

PER CENT RETAINED ON SIEVES

Mesh	4	8	14	28	48	100	—100
% by Wt.	—	12	20	24	24	15	5
Cum. %, Wt.	—	12	32	56	80	95	

"The fineness modulus is the sum of the lower row of figures divided by 100, and this is 2.75.

"To produce the required amount of aggregates, it was calculated that there would be required 278 tons per hour of blended sand . . . and that from 400-600 tons raw sand would be required to yield this." (A description of the classifying plant follows, but as this is described elsewhere, only the figures showing the work of the classifiers will be given.)



Blended classifier products fill government specification

Coarse Classifier. Feed, 400-600 tons per hr.; sand discharge, 250 tons per hr.; sand in overflow, 250 tons per hr.

PER CENT RETAINED ON SIEVES

Mesh	4	8	14	28	48	100	—100
% by Wt.	1	22	27	27	17	5	1
Cum. %, Wt.	1	23	50	77	94	99	

(Fineness modulus, 3.44)

Intermediate Classifier. The feed for this is the 250 tons per hr. of overflow of the coarse classifier. Sand discharge, 90 tons per hr.; sand in overflow, 180 tons per hr.

PER CENT RETAINED ON SIEVES

Mesh	4	8	14	28	48	100	—100
% by Wt.	—	—	3	15	44	38	0
Cum. %, Wt.	—	—	3	18	62	100	

(Fineness modulus, 1.83)

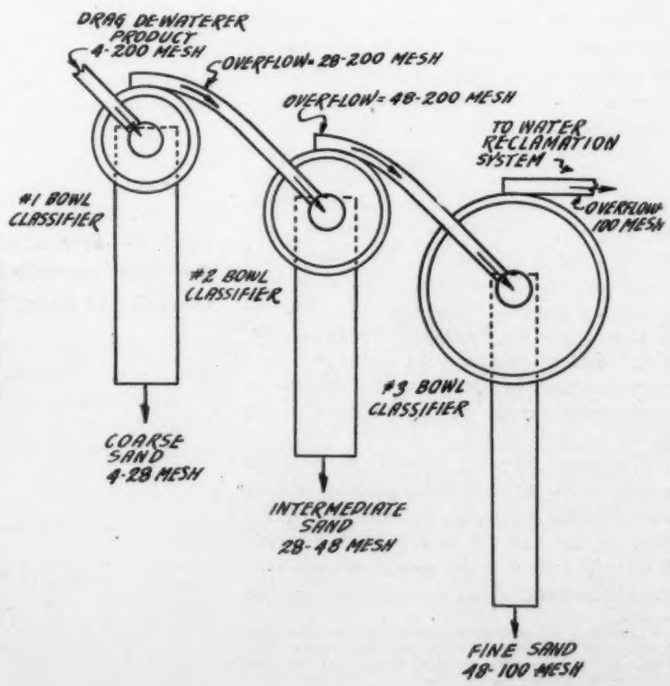
Fine Classifier. Feed, 180 tons per hr.; overflow from intermediate classifier. Sand discharge, 90 tons per hr.; overflow sand, 90 tons per hr.

PER CENT RETAINED ON SIEVES

Mesh	4	8	14	28	48	100	200	—200
% by Wt.	—	—	—	1	6	60	31	2
Cum. %, Wt.	—	—	—	1	7	67	98	

(Fineness modulus, 0.75)

The following table, taken from the paper, gives a summary of the work. It shows that the three classifier products, blended in the proportions in which they are made, form a concrete sand which fills the Government's specification, fineness modulus between 2.5 and 3.0 and a grading corresponding closely to that given. To show this the reviewer has plotted the Government's curve and the curve of the grading shown in the accompanying table:



Diagrammatic sketch of the arrangement of the three sand classifiers at the Grand Coulee dam aggregates plant

Mesh	TONS PRODUCED PER HOUR No. 1 Classifier	No. 2 Classifier	No. 3 Classifier	Total	Per Cent	Per Cent Cum.
4	2.5	...	...	2.5	0.6	0.6
8	55.0	...	...	55.0	13.4	14.0
14	67.5	2.1	...	69.6	17.0	31.0
28	67.5	10.5	.9	78.9	19.5	50.5
48	42.5	31.5	5.4	79.4	19.6	70.1
100	12.5	26.4	54.0	92.9	22.6	92.7
200	2.5	...	27.9	30.4	7.4	...
—200	...	...	1.8	1.8	0.5	...
Total	250.0	70.5	90.0	410.5	100.6	258.9

(Fineness modulus, 258.9/100 = 2.59)

The elaborate proportioning system, with its variable-speed, feeder belts and blending machine, is therefore not needed at the present time, but it may be needed when other parts of the deposit are worked.

A review of the data presented shows that the separations are in the following ranges:

The accompanying tables show the excellent work the plant is doing, and justify Mr. Anable in his conclusion, "The Grand Coulee dam sand washing plant is not only the largest in the world, but also is, probably, the highest development to date in the realm of high-specification sand production."

No. 1 Classifier, Coarse sand.....77% is 4- to 28-mesh, inclusive
No. 2 Classifier, Intermediate .....80% is 28- to 48-mesh, inclusive
No. 3 Classifier, Fine .....74% is 48- to 100-mesh, inclusive

Aggregate Production for Grand Coulee Dam*

By Gordon F. Dodge

(Abstracted by Edmund Shaw)

THE Grand Coulee Dam is noteworthy in that when completed it will undoubtedly be the largest mass of concrete ever placed. It will contain 11,000,000 cu. yd., and finding a suitable source of aggregate was no small task. However, Nature seems to have had foresight, and through the agency of glaciers she laid down a large bed of sand and gravel, 1½ miles from the east abutment of the dam. But she kept her mills working too long and made an excessive amount of sand, some of it exceedingly fine. The deposit is a mixture of granite and basalt, the basalt in sufficient quantity to give sand and gravel a dark color, also enough to keep down the percentage of mica, which has been ground very fine.

Test data were not very complete, but a study of the six 4-ft. square test holes, shown on the log (Fig. 1), developed that strata of sand, 75 to 100 ft. below the surface, extended through the deposit. This sand is too fine to be used, some samples showing 44% passing 200-mesh, sand, not silt. Because of these strata the Reclamation engineers decided that a greater area than had been planned should be opened, so that all present requirements could be met without going below the sand strata.

The engineers set a tentative ratio of 2.6 gravel to one of sand and a grading of sand shown in the accompanying curves (Fig 2). Plotting the test pit data showed that Pit 7 was the worst in the matter of sand tonnage to be handled, so this was taken as the basis of plant design. An output of 1000 tons per hour was adopted, sufficient for a continuous supply to seven of the eight 4-yd. mixers to be used. The 2.6:1 ratio called for 723 tons of gravel and 277 tons of sand per hour. From test pit samples it was seen that the feed must be 2200 tons per hour, of which 1477 tons would be sand. But, as deposits are never uniform, a maximum feed of 2500 tons per hour was adopted, 1777 tons of which would be sand. To average the output as much as possible, a "balancing" stock pile was placed between the crusher and the screening plant; and mining in two cuts, each 40 to 45 ft. deep, was adopted for the same reason.

Specifications called for gravel, 6x3-in.; 3x1½-in.; 1½x¾-in.; ¾-in. x 4-mesh; and sand graded as shown on the sand curve (Fig. 2).

The total fineness modulus of the sand in the deposit is too high, so some coarse sand had to be wasted. Fig. 3 shows how the tonnages are proportioned. There are 628 tons per hour of 4 to 20-mesh, whereas only 125 tons (19.8%) is needed. There are 532 tons per honr of 20 to 48-mesh, with 97 tons (18.2%) required. And there are 155 tons per hour passing 100-mesh which are largely eliminated by the drag dewaterers. There are 55 tons per hour of 48 to 100-mesh required, and to obtain it requires 515 tons per hour or 35% of the sand feed. An excess of the two coarse fractions has to be disposed of, and the classifier discharge chutes are arranged so that increments of 25% may be sent to the stock pile or to waste.

The material is permitted to drain in the stockpiles, and then it is moved over a tunnel in which are there feeder belts with variable feeders to blend the sand. To in-

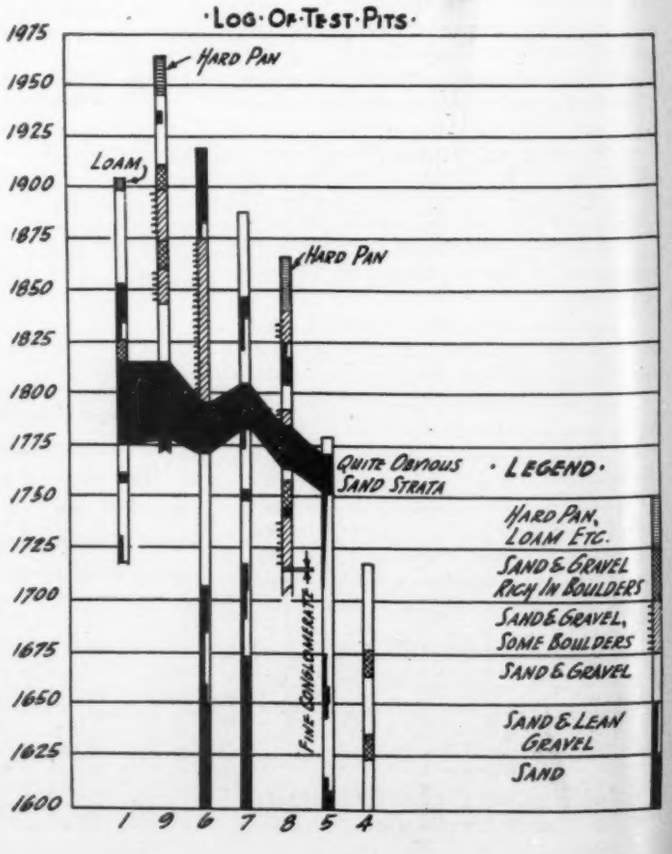
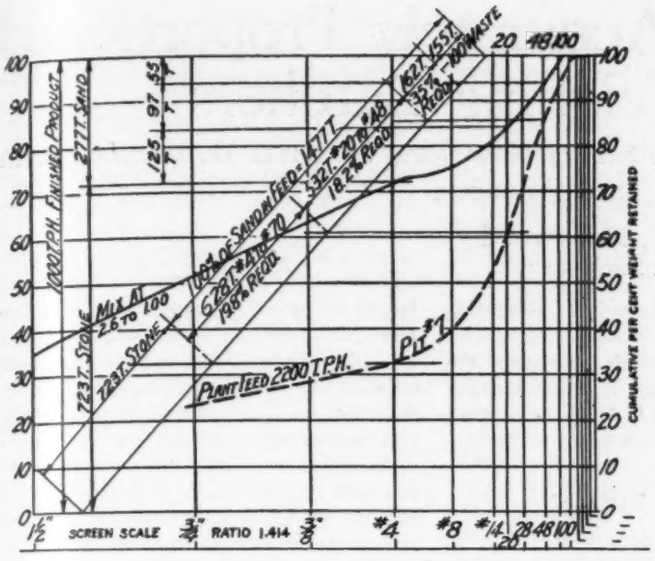
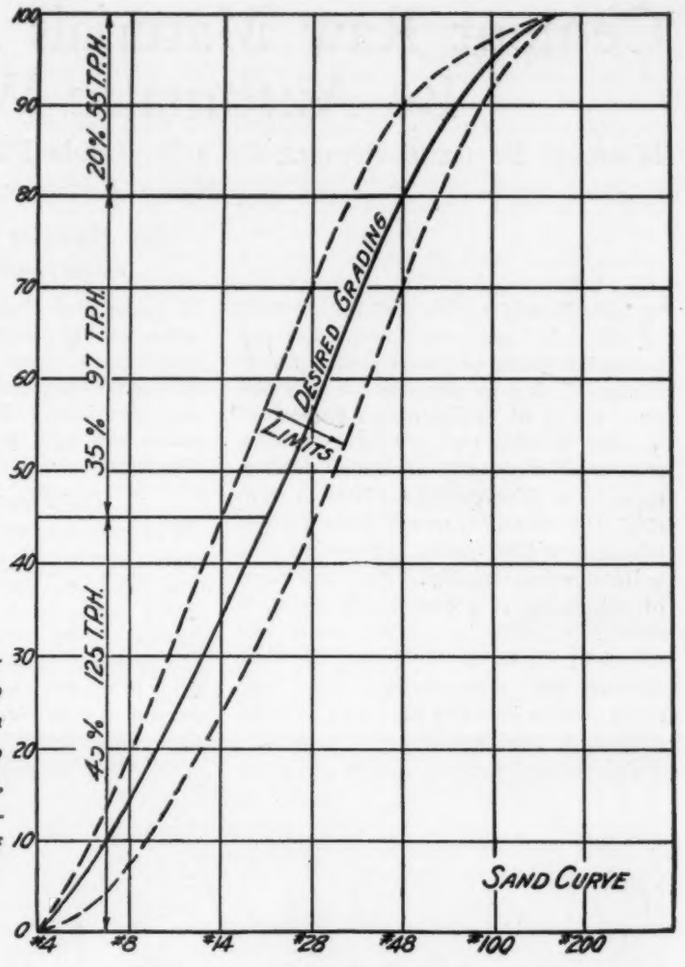


Fig. 1 — Strata of fine sand extending through the deposit

*Abstract of a paper delivered before the American Concrete Institute, February 26, 1936, by Gordon F. Dodge, Engineer of the Jeffrey Manufacturing Co.





Left, Fig. 3—Tonnages applied to feed show portion of total sand to go to classifiers. Right, Fig. 2—Curve showing grading of gravel and sand

sure thorough mixing it is passed through a foundry sand rotator. The effectiveness of this system is shown by operating tests giving fineness moduli regularly between 2.75 and 2.80.

Clarification of wash water was adopted because of the high head, 670 ft. total; the 3400 ft. of pipe line, and the expensive pumping equipment that would have been necessary to maintain a clean water supply from the river. The possibility of using wash water to dispose of waste sand was considered but careful estimates indicated economy in plant cost and operation would result from the use of conveyors, with the advantage that the waste area would be sufficient for the entire project.

(The description of the plant has been omitted because this appears elsewhere.)

Sand-Lime Brick Production and Shipments in January, 1936

THE FOLLOWING DATA are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States and Canada. The accompanying statistics may be regarded as representative of the industry.

Nine active sand-lime brick plants reported for the month of January, this number being the same as that reporting for the month of December, statistics for which were published in February.

Average Prices for January

Shipping Point	Plant Price	Delivered
Pontiac, Mich.	$10.50	.....
Grand Rapids, Mich.	....	$12.50
Detroit, Mich.	....	11.50
Mishawaka, Ind.	9.25	.....
Syracuse, N. Y.	14.00	16.00-20.00
Saginaw, Mich.	10.50	.....
Sioux Falls, S. D.	12.00	.....
Toronto, Ont., Can.	12.00	13.50

Statistics for December and January

	December†	January*
Production	1,273,560	485,610
Shipments (rail)	33,000	36,350
Shipments (truck)	896,084	714,370
Stocks on hand	2,450,924	2,045,531
Unfilled orders	1,225,000	1,690,000

†Nine plants reporting; incomplete, three not reporting unfilled orders. *Nine plants reporting; incomplete, two not reporting unfilled orders.

Masonry Cements a Growing Industry

U. S. Bureau of Mines reports hydraulic cements other than portland, which include natural and puzzolan cements, and masonry cements of the natural cement class, produced in the United States in 1934, amounted to 671,588 bbl., which represents an increase of 43.9% in comparison with 1933. In 1934 there were shipped from the mills 678,204 bbl. of these cements, valued at $960,732, an increase of 56.8% in quantity and 68.1% in gross value as compared with 1933. Stocks at the mills decreased and were 3.6% lower at the end of 1934 than at the end of 1933. The average factory value per barrel of the product shipped from the mills was $1.42 in 1934 and $1.32 in 1933.

The statistics in 1934 represent the output of 14 plants located as follows: One each in Illinois, Indiana, Kansas, Kentucky, Minnesota, Ohio, Virginia, and Wisconsin, and two each in Alabama, New York and Pennsylvania.

MASONRY, NATURAL, AND PUZZOLAN CEMENTS PRODUCED, SHIPPED, AND IN STOCK

Year	Active plants	Production Barrels	Shipments Barrels	Shipments Value	Stocks (Dec. 31) Barrels
1934[1]	14	671,588	678,204	$960,732	176,070
1933	13	466,632	432,415	571,648	[2]182,686

[1]Includes hydraulic lime.
[2]Revised.

Portland Cement Pavement Yardage

AWARDS of concrete pavement for January, 1936, were announced by the Portland Cement Association as follows:

	Sq. yd.
Roads	1,216,565
Streets	1,007,898
Alleys	25,915
Total	2,250,378

To Work Nights

Atlantic Gypsum Products Co., Portsmouth, N. H., according to local news dispatch, is expecting to put on a night shift within the near future in order to take care of the orders on hand. Freight shipments of approximately 200 carloads each month are being made from the plant. No shipments by water of gypsum rock from the company's mines in Nova Scotia are expected to be brought to Portsmouth before the latter part of May or the first of June, because of the inability to mine the rock during the winter months.

Cement Raw Materials Accurately Proportioned By Automatic Weighing Batchers

Missouri Portland Cement Co.'s St. Louis Plant Has New Raw Material Department with Many Advanced Improvements

By Nathan C. Rockwood
Editor, Rock Products

THE PORTLAND CEMENT INDUSTRY is rapidly outgrowing the time-honored methods of raw material proportioning. This is partly the result of a constant raising of quality of the product, of a better knowledge of cement composition and manufacture, and of recent developments in weighing devices not hitherto available. It is, of course, more difficult to maintain uniform high quality in a product than uniform normal quality. And the secret of uniformity, to a considerable extent, is accurate proportioning of the proper raw materials; the higher the quality, the more accurate the proportioning. Also, the newer cements introduce the use of more ingredients to be measured.

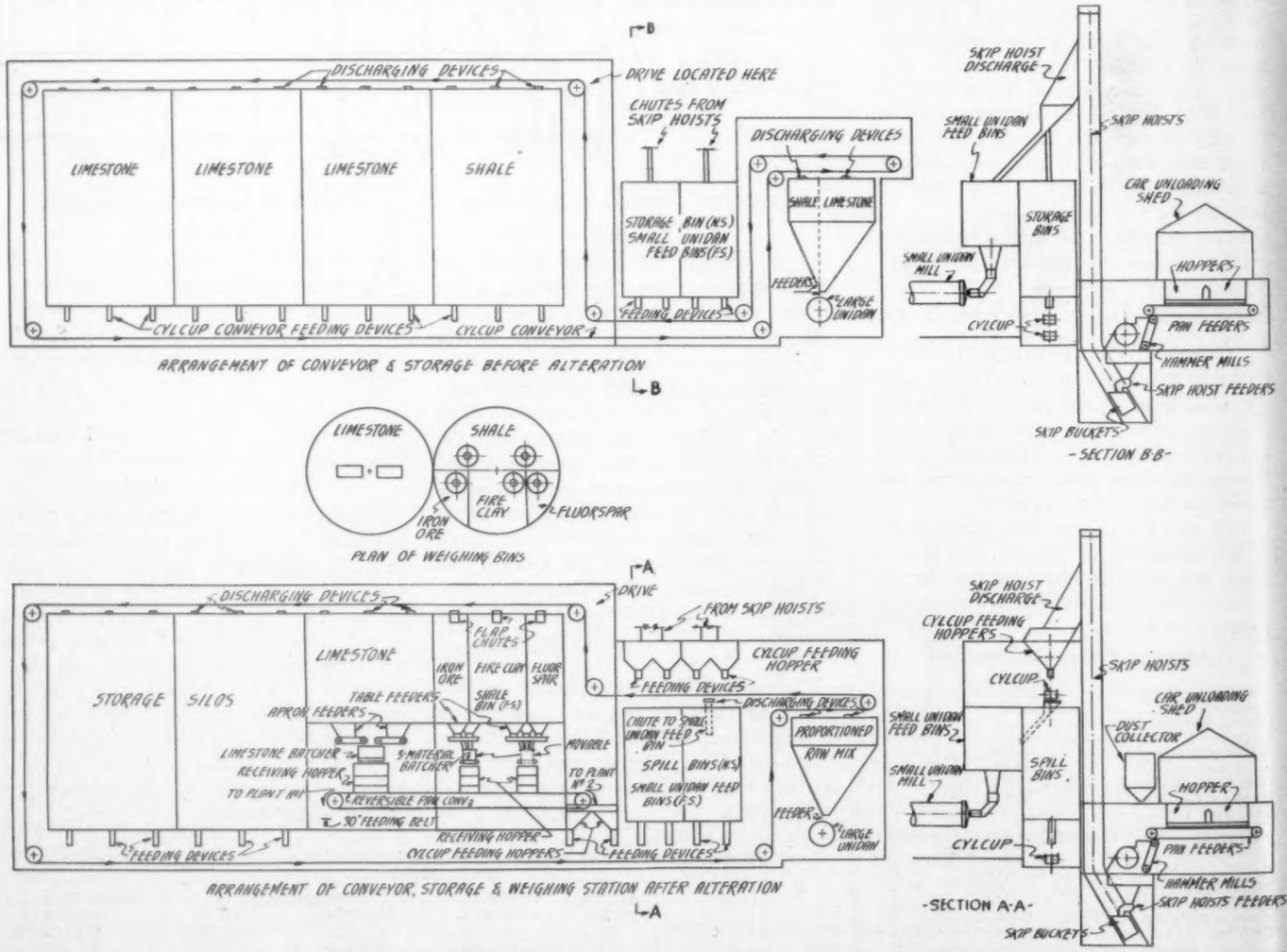
The Missouri Portland Cement Co., at its St. Louis, Mo. (Prospect Hill) plant has, at this writing, a raw material handling and proportioning plant which represents the most advanced practice. It was completed and placed in operation in 1935. It is practically automatic in operation, dust-free, compact and simple.

Old Plants Replaced

Raw materials are brought to the plant from a distance in standard-gauge railway cars. Shale and limestone are handled separately—originally in separate and distinct crushing plants. Shale crushing was done in a Williams Jumbo hammer mill, and to get it to the raw materials distributing system and storage bins required one inclined 20-in. belt conveyor 188 ft. c. to c., one horizontal 20-in. bucket elevator, and one 18-in. bucket elevator. Limestone was crushed in three No. 5 Gates gyratory crushers and a Dixie hammer mill, and to get it to the raw material distributing system required an 85-ft. 24-in. belt conveyor and a 24-in. elevator. The mixture was proportioned on three hand-operated scales and the mix conveyed to the raw mill feed bins by a 30-in. pan conveyor and 168 ft. of 24-in. belt conveyors. This crushing plant was on the opposite side of the incoming railway tracks from the new plant; or, in other words, the original crushing plant was separated from the raw material storage bins by these tracks.

New Plant

The first step was to move the crushing plant to alongside the end of the row of raw material silos, and to combine all the crush-



Longitudinal sections of the Missouri Portland Cement Co.'s raw material handling and storage plant before (above) and after (below) the changes described in the article were made

ing in a pair of size 5040 Dixie hammer mills, both of which can be used for limestone or for shale. The raw material is received in hopper-bottom cars, which dump into track hoppers. Two 36-in. by 25-ft. centers, Chain Belt Co. steel apron feeders empty the track hoppers and feed the hammer mills with material already crushed to pass a 6-in. round hole.

The tracks and track hoppers are above ground level, so that the hammer mills and their 200-hp. Westinghouse motor drives are about on ground level. This housing also contains two Northern Blower Co. (Norblo) suction fans, each with a capacity of 26,000 c.f.m. with 8-in. suction. These have intakes at all points in the system where dust is created; this dust is removed in two Norblo dust collector units, each 40 ft. long, placed between the crusher housing and the concrete silos. The dust collectors discharge back into the skip-hoist feeders, forming a closed system.

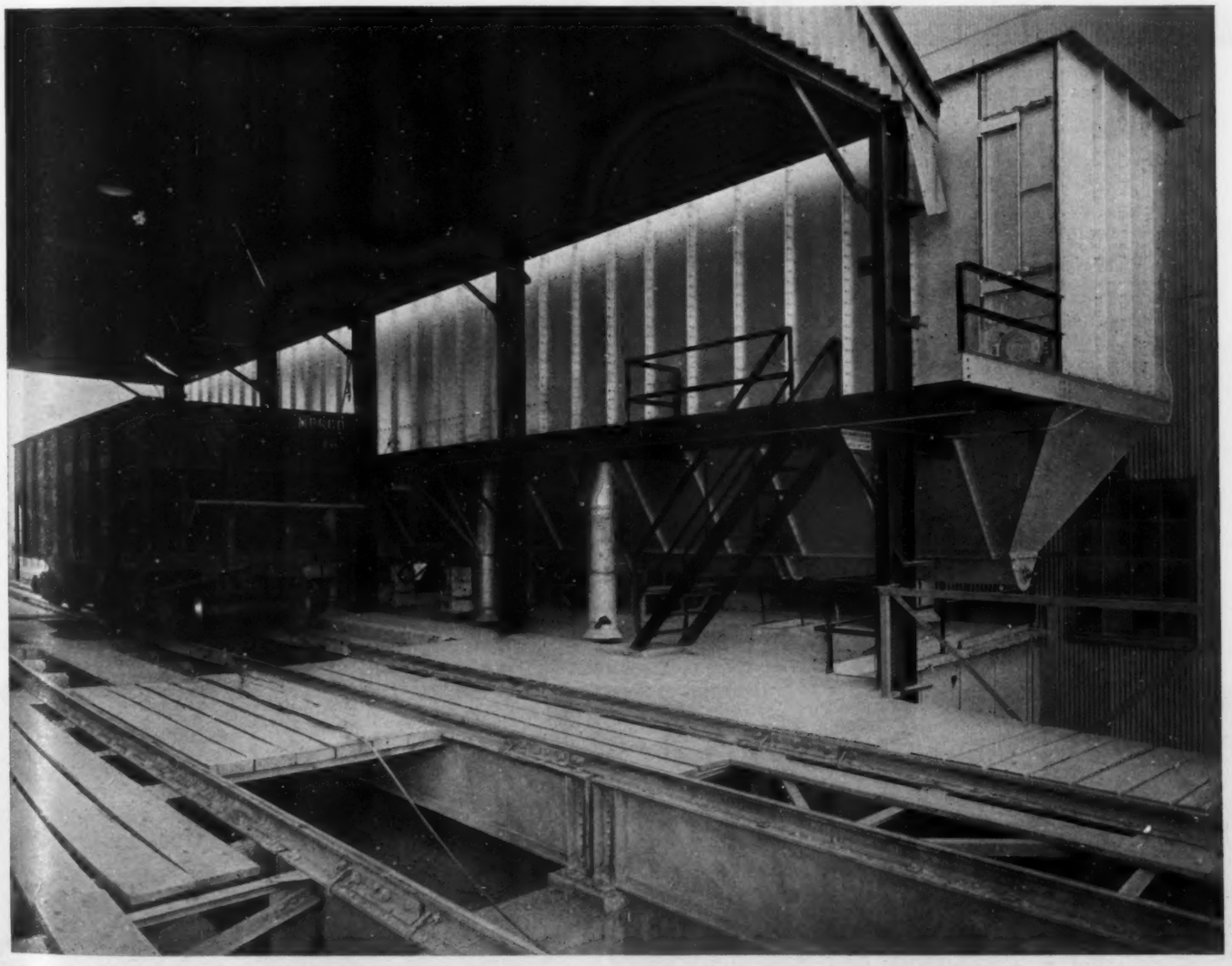
The skip-hoist feeders are gates operated automatically in raising and lowering the automatic skip hoist buckets. Each bucket holds 3 cu. yd., and the vertical lift is 95 ft. The skip hoist is the automatic, balanced type made by the R. H. Beaumont Co. The system is designed to handle 350 tons per hour.

Originally, the skip hoists discharged to limestone, shale or other raw material bins, which were tapped below to an F. L. Smith & Co. Cylcup conveyor which rose to the tops of the row of silos, discharged into them, and came back on the other side and down under the silos, back under the skip hoist bins, up again over the tops of the Unidan raw mill feed bins, where the raw materials were proportioned and combined. Thus the material was three times elevated almost the height of the silos, merely to be returned to the mill feed bins in the same condition it started out. An auxiliary discharge spout permitted feeding the bin of a small Unidan mill direct from the skip-hoist discharge hopper.

This system was much simplified. The skip-hoists were provided with discharge hoppers which feed directly to the Cylcup conveyor now raised to a position on top of the former feed bins, thence elevated to the tops of the silos, as before.

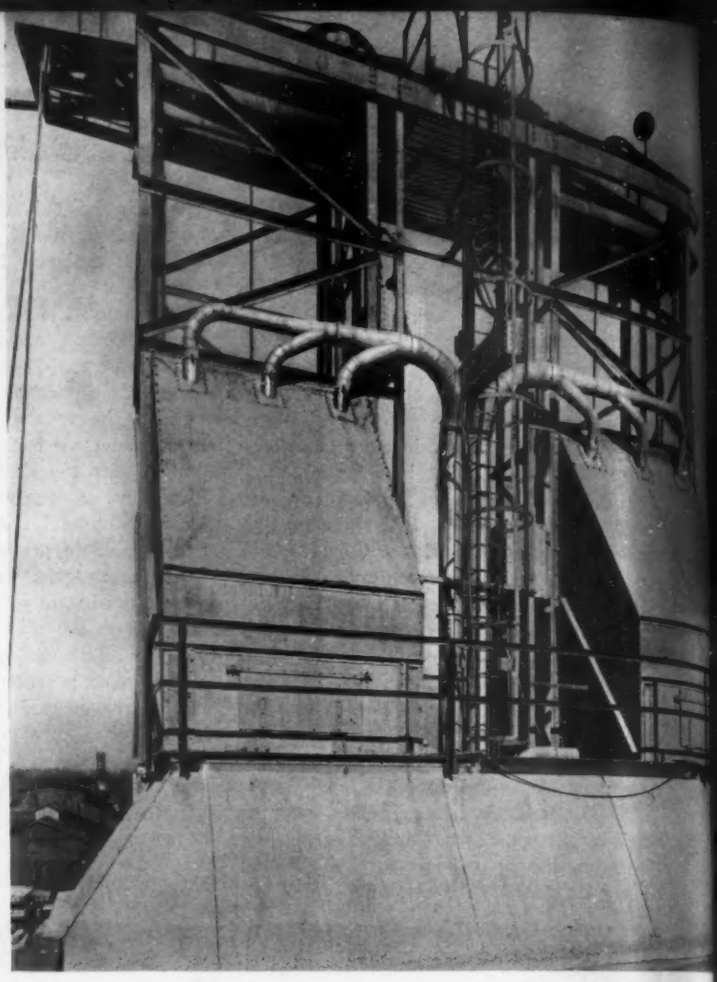
The Cylcup conveyor is a standard piece of equipment, but perhaps unfamiliar to many readers. It is a chain-bucket conveyor and elevator, in which the buckets maintain an upright position except when dumping. Dumping is accomplished automatically by tripping the buckets at any desired point. Different kinds of rollers, which actuate the tripping mechanism, permit the conveyor to carry two materials simultaneously, each being emptied into its proper bin. A similar tripping device at the loading point opens the proper gate to fill the bucket with the desired material. Thus three successive buckets might be filled with limestone, and the fourth with shale, so that the raw materials can be roughly proportioned by this carrier, if desired.

In this installation it is used merely as a conveyor to put the raw materials into storage and take them out. The buckets have 8 cu. ft. theoretical capacity each, but to increase the capacity of the system the linear speed was increased from 62 to 91 ft. per min., which results in some spill at the loading gates. This is taken care of by "spill



General view of the car dumping hopper for receiving raw material from standard railroad equipment, and three units of dust collector installation in the background

Pair of hammer-mill crushers for handling both limestone and shale in either one or both units



Dust collector hoods and intakes over the skip hoist dumps

bins" below, which feed back to the skip hoists. A 20-hp. Westinghouse induction motor and a Falk speed reducer drive the Cylcup carrier.

Weighing Batchers

To provide absolutely accurate and foolproof proportioning, a unique installation has been made. The two cylindrical concrete silos nearest the skip hoist were cut off at their middle, new bottoms placed, and the room below them, thus created, was used to place the feeders, batchers and mix conveyor.

One of these half-silo bins holds limestone, the other is divided into four compartments, for shale, iron ore, fire clay and fluorspar, all used in standard or special cements. The limestone is withdrawn from its bin by a pair of Chain-Belt steel apron feeders to a Blaw-Knox weighing batcher; the other four materials are withdrawn by adjustable table feeders to a three-material Blaw-Knox weighing batcher.

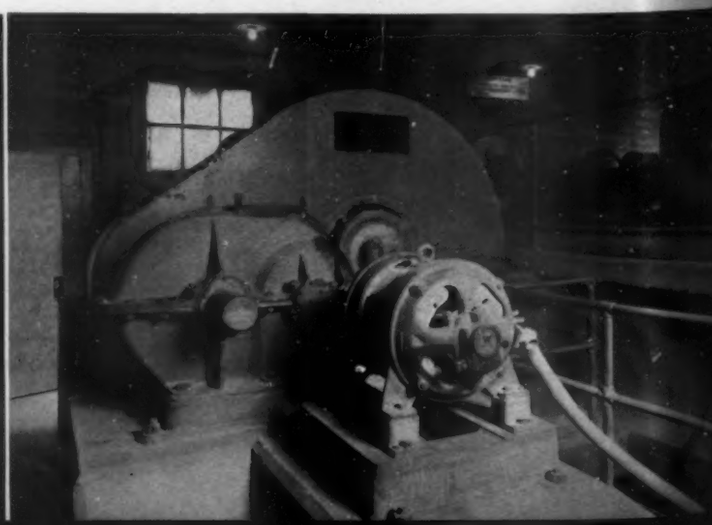
This batcher is the first of the kind. The accompanying views show most of the important details: (1) shows a front view of the batcher with scale box open; (2) shows a right hand side view of the batcher with electrical control box open; (3) shows a left hand side view of the batcher, and covers the important details of the discharge gate and operating mechanism.

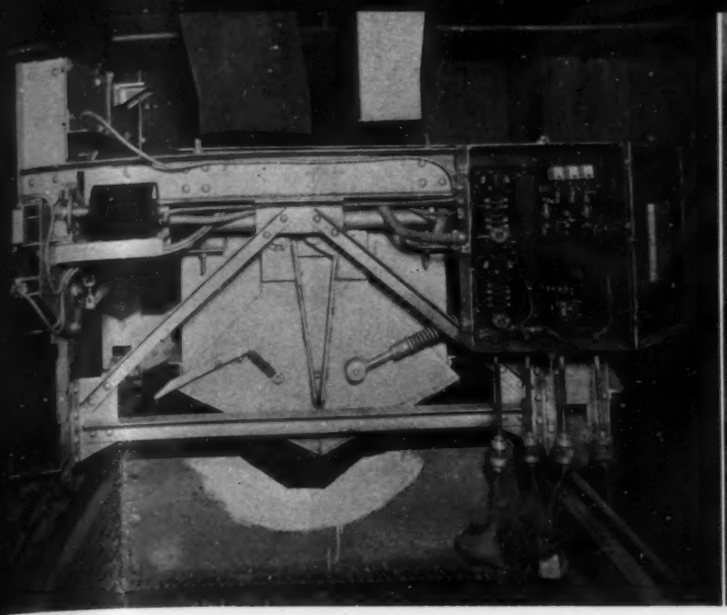
It is arranged to weigh either two or three materials into the same batch hopper automatically and is mounted on wheels, so that it may be shifted under either of two sets of table feeders mounted under the material silos. The table feeders discharge into chutes, which extend to within approximately 6 in. of the weighing hopper.

The batcher is equipped with a clam-shell type discharge gate operated by a 1-hp. geared head motor through suitable linkage. It is supported on an overhead suspension hopper scale, equipped with three charging beams and one empty beam box, which is also equipped with electrical contacts. The indicator is connected to the scale beam through an equalizing bar in such a manner that when the counterpoises are set for a given batch, the indicator will show balance at the full position when the proper amount of material is in the hopper.

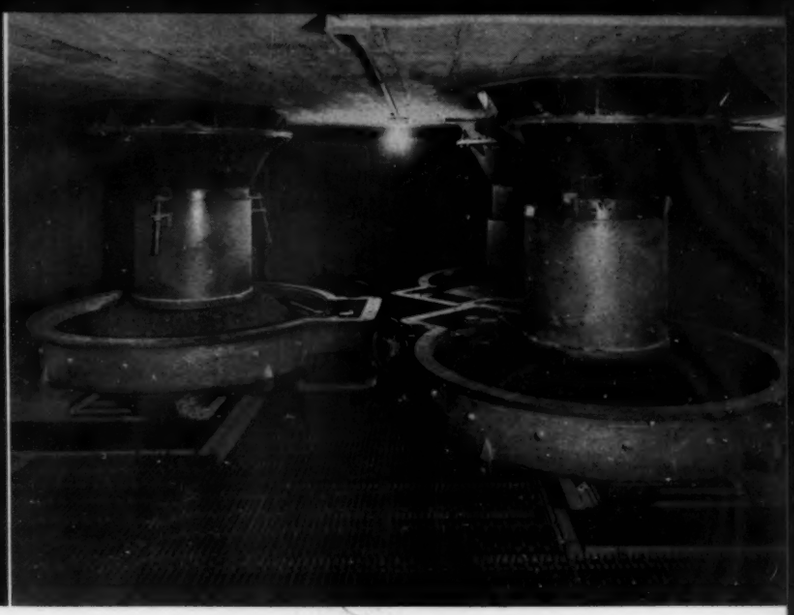
Conveyor for raw materials from the skip dumps to the storage bins and weighing batchers

Geared motor drive of the raw material conveyor shown in the view at left





End view of shale and iron ore batcher, showing contactors in box enclosure



Raw material feeders (motor driven) to the hoppers of the weighing batchers below

and will come to balance at empty when the material has been fully discharged.

The materials are batched into the hopper consecutively, the proper table feeder being started and stopped, and the proper scale beam being thrown in and out of action by means of a thrustor operated mechanism, which includes a drum switch to change over the electrical connections operated by cam and ratchet mechanism, which also operates the scale beam locks.

Operation of Three-Material Batcher

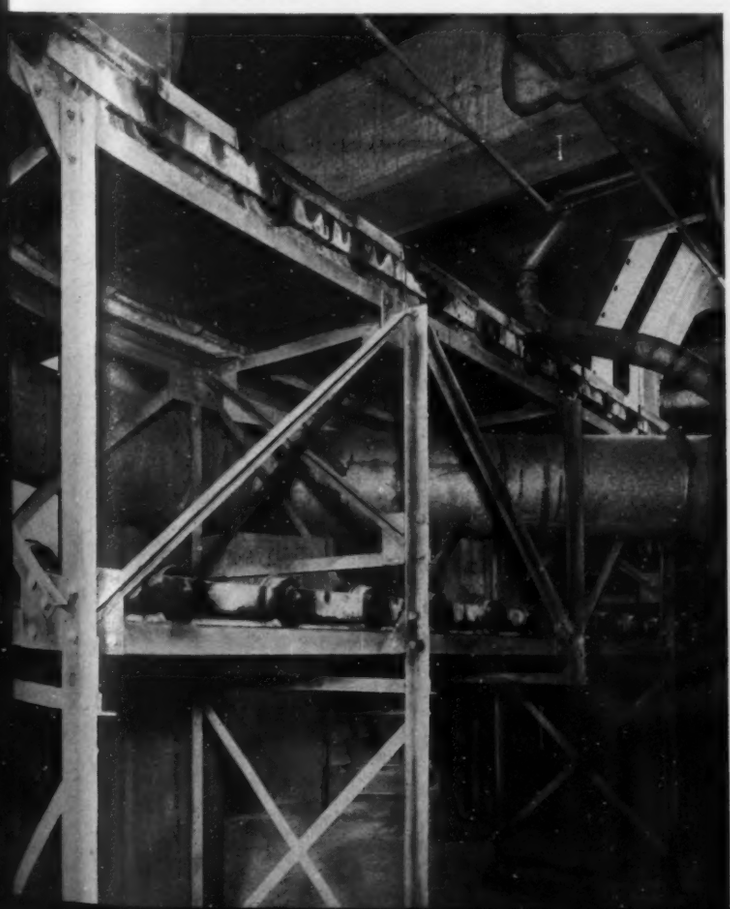
When the discharge gate is closed, the table feeder handling the first material to be weighed is automatically started. This material is weighed on the first or upper beam in the scale box, and, as the second and third weigh beams have been automatically locked when the discharge gate was previously opened, the material will be fed into the hopper until the scale comes to balance at a weight corresponding to the setting of the first counterpoise. When the scale comes to balance with the first material being weighed in the hopper, the first table feeder is automatically shut off and the second table feeder automatically started, the second scale beam also being automatically unlocked, allowing it to come into action so as to weigh material No. 2.

When the second material brings the scale to balance, the second table feeder is shut off and the third table feeder started automatically, and at the same time the third scale beam is unlocked.

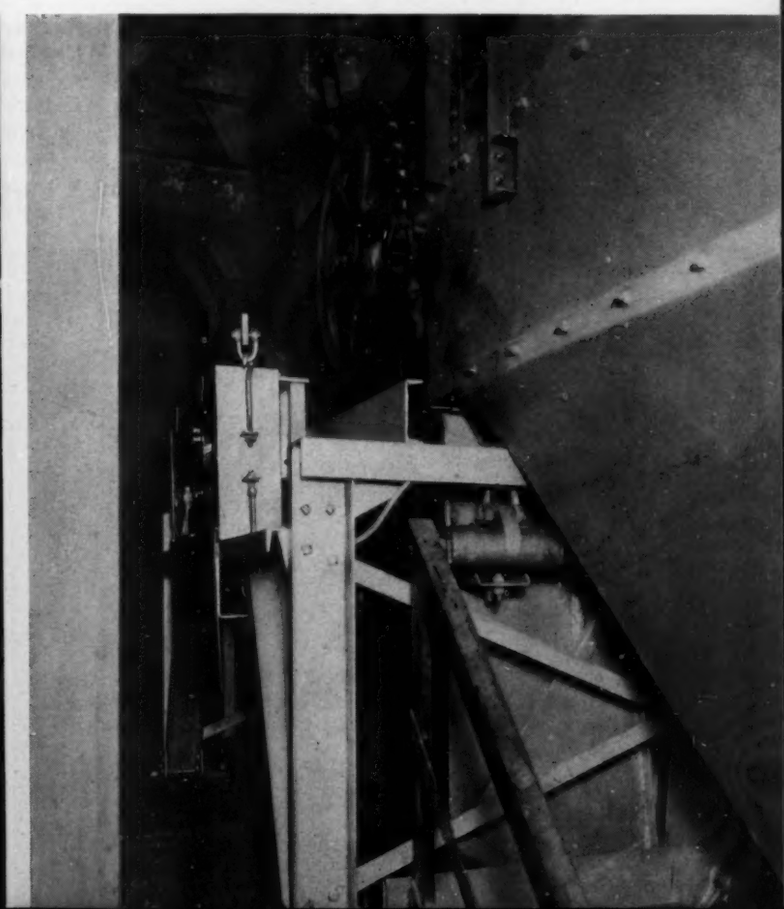
When the third or last material is fully weighed and the scale comes to full balance, the thrustor and drum switch mechanism automatically moves to its fourth, or discharge, position.

The batcher is discharged by a Telechron clock operated switch which makes a contact every two minutes, but material cannot be discharged unless the drum switch is at the fourth, or discharge, position.

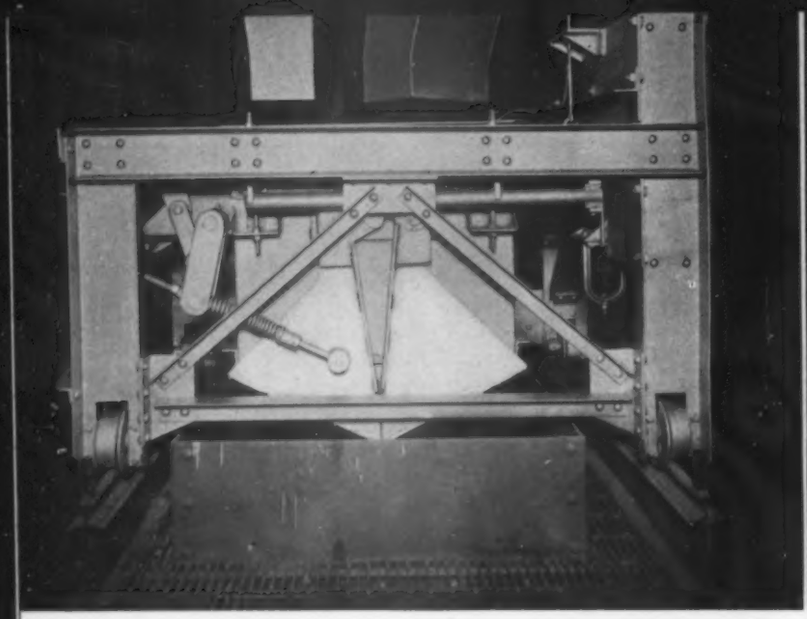
When only two materials are being weighed, the operation is the same as described above, except that the thrustor and drum switch mechanism moves directly from position No. 2 to position No. 4 immediately after the second material has been weighed.



Pan conveyor for batched raw materials from the batchers, with the dust collector pipe between



Another view of the 10,000 lb. automatic limestone weighing batcher, showing beam box



End view of the shale and iron ore automatic batcher. Note the rails and wheels

Discharge of the belt conveyor handling raw materials to the No. 2 plant for grinding

Limestone Batcher

The limestone batcher is filled by means of two apron feeders located directly under the material silo and driven by a common motor and speed reducer. As the hopper is rectangular in shape, the use of two feeders with discharge spaced approximately 4 ft. apart insures the most economical use of the hopper capacity, as it is possible to fill the hopper practically level full without any spilling. It holds 10,000 lb.

The scale is of the same general type as described for the three-material batcher, except that there is only one charging beam and one empty beam.

The two apron feeders are automatically started when the discharge gate is closed and the material feeds into the hopper until the electric contact in the scale indicator is closed at the predetermined cutoff point.

The discharge gate is of the clam-shell type operated by a 2-hp. geared head motor and a dead-center crank mechanism, similar to that on the three-material batcher.

The electrical control box on this batcher is also similar to that on the three-material batcher with the exception that it contains the Telechron operated switch adjusted for a two-minute total cycle.

* * *

The batchers are so interlocked that when the clock makes contact at the end of two minutes, both batchers will be discharged simultaneously if they have both been filled to the correct weight. If one of the batchers has not been filled to the correct weight, due to trouble with the feeders, etc., neither batcher will be discharged until the clock again makes contact, the batcher having been filled during the interim.

Both batchers are equipped with a tell-tale relay and remote indicating lamp, which is placed at a convenient point so that the supervisor may know that the batchers are functioning properly at all times. The lamps light when the batchers are full and go out when the batchers are empty.

The operation of these batchers is fully automatic in all respects, requiring no attendant for their continuous operation.

The table feeders are especially ruggedly built, 6 ft. in diameter. They were designed by Richard Uhlig and built by the Medart Corp., St. Louis. Two adjustments are possible: (1) the inlet pipe column may be raised or lowered; (2) the angle of the plow may be changed by a hand screw.

Handling Batched Mix

The batchers discharge to a reversible Chain-Belt pan conveyor to feed either the Cylcup carrier to take the mix to the Unidan mills of Plant No. 2 (the high early strength cement plant) or to a 30-in. Link-Belt conveyor in a tunnel to Plant No. 1 (standard cement). This belt conveyor discharges to a 30-in. Chain-Belt pan conveyor on a steep incline, which feeds the three Kominuter bins by means of a reversible 24-in. belt conveyor over these bins.

As already noted, the suction fans in the crusher house trap dust at all points in this system, so that it is a practically dust-free operation.

Conclusions

These changes accomplished the following radical improvements:

(1) Discontinuance of operation of obsolete limestone crushing equipment at Plant No. 1.

Another view of the raw material conveyor to the No. 2 plant (left) showing the method of dust collector intake installation (right)

(2) Discontinuance of operation of separate shale crushing equipment.

(3) Centralization of limestone and shale crushing operation at the modern crushing station of Plant No. 2.

(4) Perfect control of raw mixes for delivery to both plants.

Personnel

The work described was done by the cement company's own employes and was planned and supervised by Richard G. Uhlig, general operating manager. C. E. Phillips is superintendent. The president of the Missouri Portland Cement Co. is M. Moss Alexander.

Fourth Annual Mineral Industries Conference of Illinois

THE FOURTH Annual Mineral Industries Conference of Illinois, in which the State's mineral and engineering organizations will participate, will be held at Urbana, April 24 and 25, according to an announcement made by Dr. M. M. Leighton, Chief of the Illinois State Geological Survey.

The conference will be sponsored by the Geological Survey Division of the State Department of Registration and Education, the Engineering Experiment Station of the University of Illinois, and the Illinois Mineral Industries Committee.

With research as the theme of the conference this year, an opportunity will be presented to all who are interested in the production, fabrication and marketing of minerals and mineral products derived from the fuel and non-metallic resources of Illinois, to secure the latest information on current and planned researches, and the large possibilities of research, when applied to specific mineral industries.

A speaker of national reputation, whose name will be announced later, will open the conference with an address which will emphasize the present necessity of planned research for the mineral industries.

On Friday a full half-day will be devoted to demonstrations and open discussions of research accomplishments and current research projects of the Illinois Geological Survey and coöperating organizations, at which time representatives of the industries will be invited to contribute their own ideas and suggestions.

Saturday forenoon will be devoted to open forum discussions directed at the formulation of a complete outline of the research development and needs of the mineral industries of the State.

Plant Improvements

Marquette Cement Manufacturing Co., Chicago, Ill., will start soon to make improvements at its Cape Girardeau, Mo., plant, including installation of B & W coal mills for direct firing of the kilns, construction of a 350-ft. stack and dust collectors.

Sand-Lime Brick Manufacturers Hold Annual Meeting

THE Sand-Lime Brick Association met in Detroit, Mich., February 17 and 18 for its first meeting since its NIRA code authority ceased to function. C. H. Carmichael, Medfield, Mass., president, acted as chairman, and reviewed the history of the organization.

After the usual committee reports the association listened to an admirable address by John L. Jackson, the daddy of the sand-lime brick industry in America, on "Past, Present and Future of Sand-Lime Brick," in which subject he is as enthusiastic as ever.

J. C. R. Felker discussed "Trend of Brick Sizes." The subject was also discussed by Frederick Heath, Jr., of the Common Brick Manufacturers Association. C. H. Carmichael followed with a "Report on Proposed Weathering Test," including the work being done by the American Society for Testing Materials.

J. Finkbeimer described the manufacture of sand-lime block by the Michigan Pressed Brick Co., Detroit. These blocks are made in a concrete block machine but steam processed as in the manufacture of sand-lime brick. They are proving very popular in Detroit, being light colored, as strong as concrete block, and can be sold at a price in competition with concrete block. They are also said to be free from shrinkage.

Harold J. Levine spoke on "Lessons from the Code," which were very much the same as the lessons all business men learned from too close contact with the Washington government.

Time out was taken to visit the several sand-lime brick plants in the vicinity of Detroit. A new set of bylaws was adopted and the following officers were elected: President, Harold J. Levine, National Brick Co., Long Island City, N. Y.; vice-president, W. A. Smythe, York Sand Stone Brick Co., Toronto, Ont.; secretary and treasurer, J. Morley Zander, Saginaw Brick Co., Saginaw, Mich. The executive committee is composed of C. H. Carmichael, Medfield Brick Co., Medfield, Mass., chairman; Thomas Lineaweaver, Grays Ferry Brick Co., Philadelphia, Penn.; J. C. R. Felker, Missouri Hardstone Brick Co., St. Louis, Mo.

To Build Plant

American Cyanamid Co., New York City, has acquired 4500 acres of phosphate property southwest of Fort Meade, Fla., and will erect a mining, washing and drying plant to cost about $250,000.

Changes Owners

Zenith Limestone Co., Tulsa, Okla., was sold recently by the liquidating agent of the Exchange Trust Co., Tulsa, for $37,600 to the **Hughes Stone Co.**, Tulsa. The sale was made at public auction to satisfy the trust company's judgment for $37,000.

Cement Statistics

THE portland cement industry in January, 1936, produced 3,630,000 bbl., shipped 3,889,000, and had in stock at the end of the month 22,649,000. Production and shipments in January, 1936, showed increases of 13.4 and 36.6%, respectively, as compared with January, 1935. Stocks at mills were 4% higher than a year ago.

The factory value of the shipments from the mills in 1935—74,934,000 bbl.—is estimated as $113,411,000, representing an average value of $1.51 per bbl.

According to the reports of producers the shipments totals for 1935 include approximately 2,109,000 bbl. of high-early-strength portland cement with an estimated mill value of $4,032,000.

The statistics here given are compiled from reports for January, received by the Bureau of Mines, from all manufacturing plants except one.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 162 plants at the close of January, 1935 and 1936.

RATIO (PER CENT) OF PRODUCTION TO CAPACITY

	January		December	November	October
	1935	1936	1935	1935	1935
The month	14.1	16.1	25.6	32.2	33.1
The 12 months ended	28.8	29.0	28.6	28.1	27.6

Buys Another Lime Plant

United States Gypsum Co., Chicago, Ill. announces the purchase of the properties of the **Idaho Lime Co.**, at Evans, Wash., which are now being operated as a part of the U. S. G. Co. R. B. Evans, son of the founder of the Toledo Lime Co., has become associated with the U. S. G. Co., and it is announced that no changes in personnel are contemplated. According to a local newspaper the purchase price was in the neighborhood of $250,000.

Develops Silica Deposit

Chas. Siebenthal, Lancaster, Calif., is developing a silica deposit in Red Rock canyon, 40 miles north of Mojave.

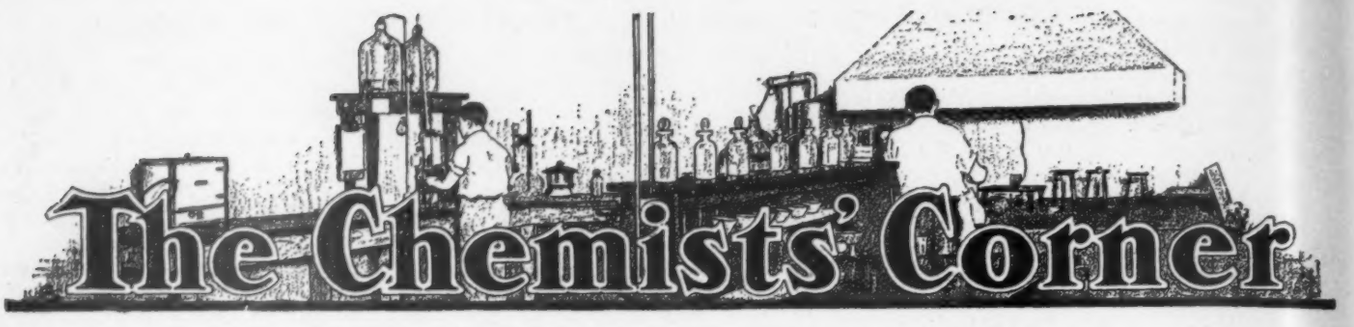
Lime Industry Grows

THE LIME INDUSTRY received three and one-third million dollars more gross income in 1935 than in 1934 and tonnage increased 22%, according to the Bureau of Mines preliminary estimate just released. The data, exclusive of dead-burned dolomite, are summarized as follows:

SHIPMENTS OF LIME IN 1934 AND 1935

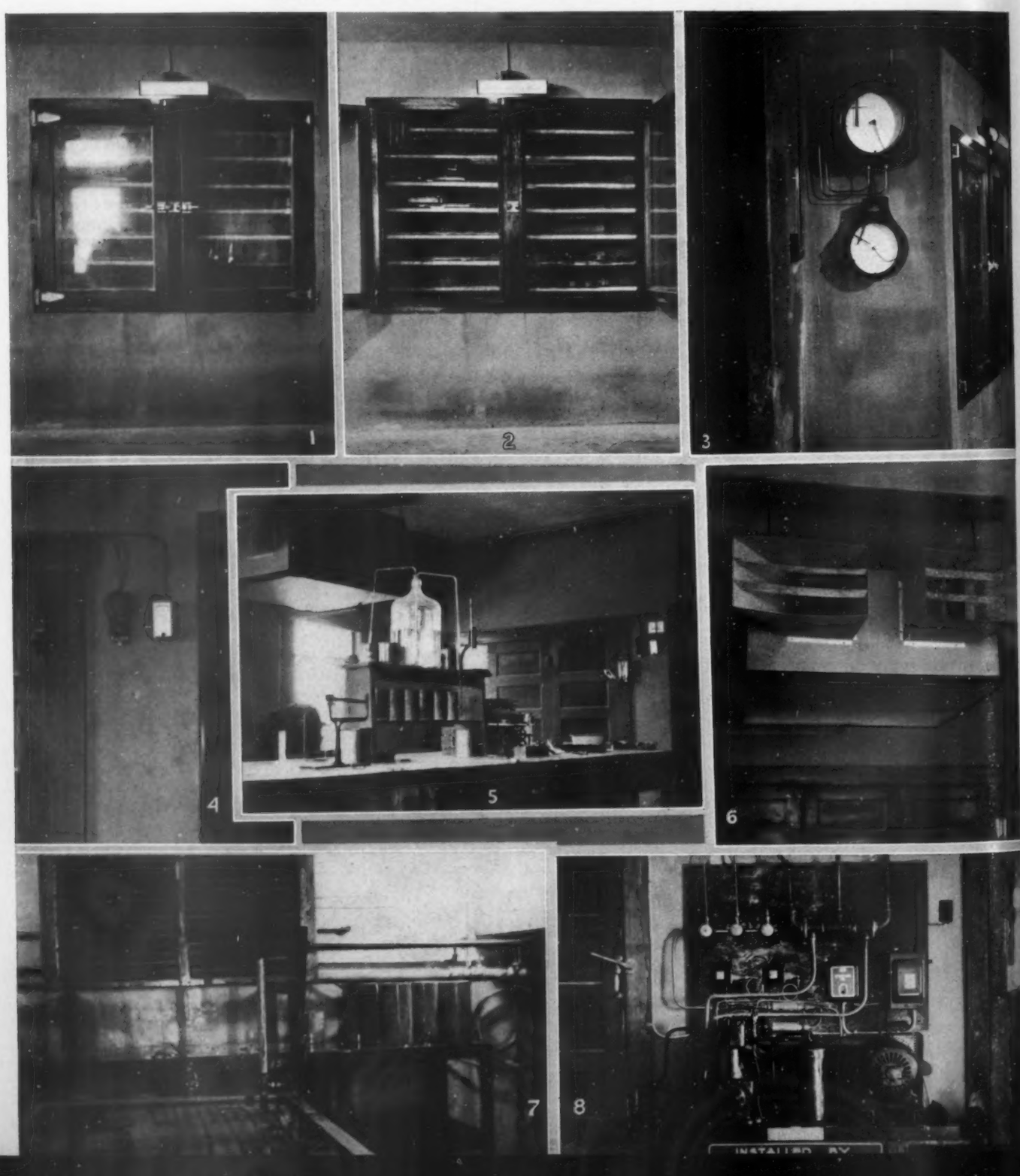
	1934 Short tons	Value
Agriculture	222,077	$ 1,478,128
Building	511,419	4,260,865
Chemical	1,338,723	8,726,617
Total	2,072,219	$14,465,610

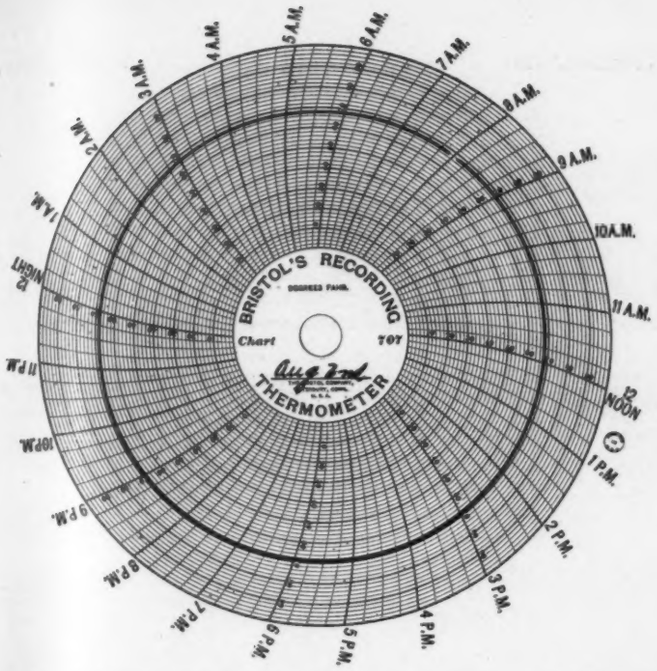
	1935 Short tons	Value
Agriculture	275,000	$ 1,857,000
Building	677,000	5,716,000
Chemical	1,570,000	10,255,000
Total	2,522,000	$17,828,000



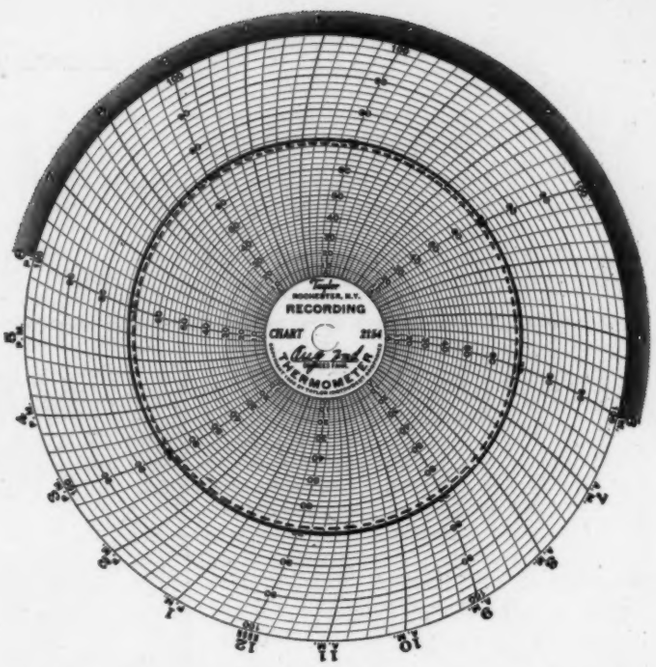
New Laboratory of Republic Cement

(Contributed by G. P. Horn, Chief Chemist)





Recorded temperature of water in briquette storage tanks

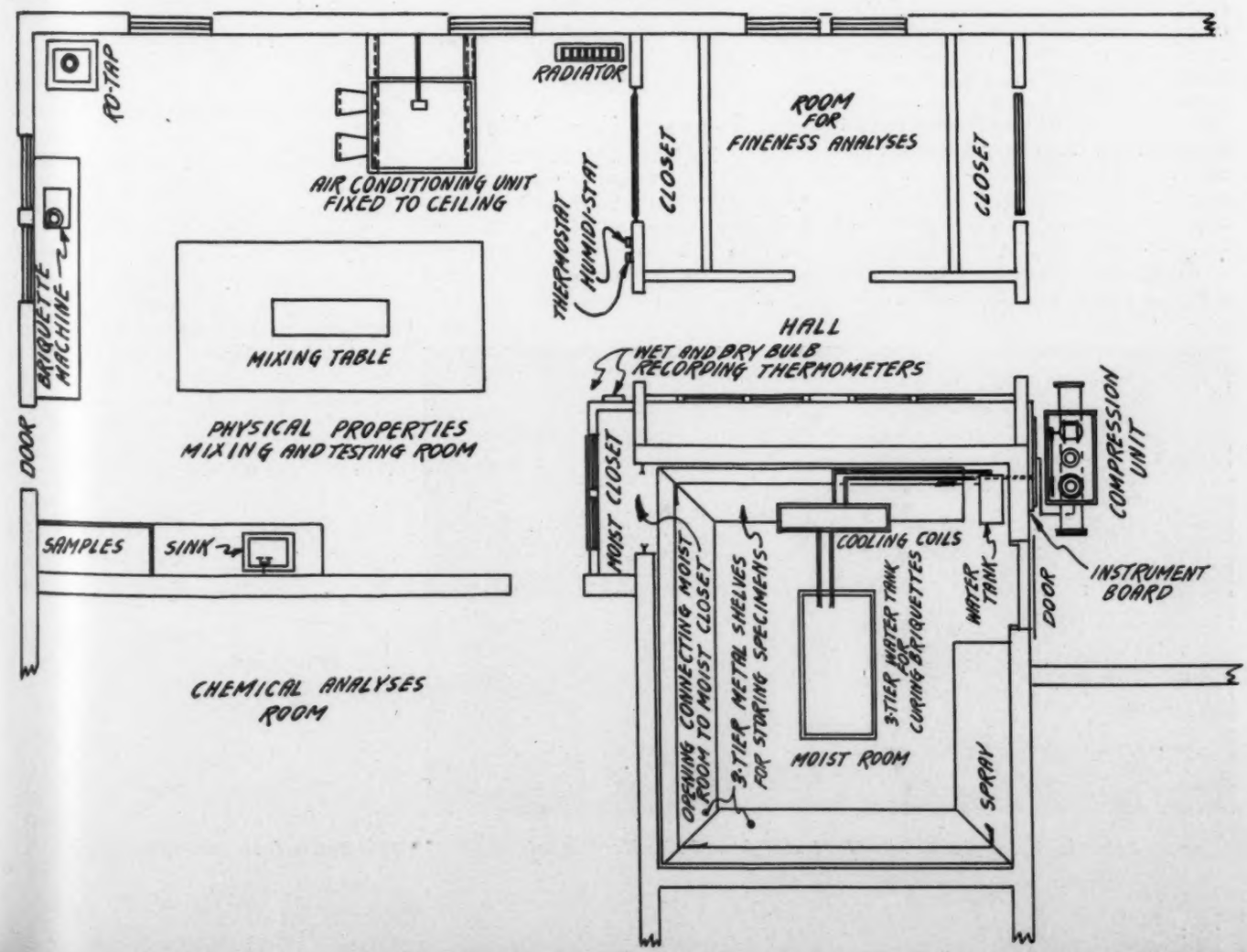


Recorded temperature and humidity of moist closet

On the opposite page

1—View of moist closet. This is built of concrete, with 4-in. walls. For shelves, 1-in. pipe was used. The closet has double-glass refrigerator doors. Closet is connected to large moist room by opening through wall at back of moist closet. 2—Moist closet, open. 3—Recording wet and dry thermometer for moist closet, above, and recording temperature thermometer for briquette storage tank water, below. The briquette tanks are installed in the large moist room. 4—Thermostat and humidistat controls for the mixing room. 5—View inside of mixing room. Air conditioning unit in upper left-hand corner; automatic controller units on right, between doors. 6—Air conditioning unit in mixing room. 7—View inside of moist room showing cooling coils, water storage, briquette storage tanks and shelves for storing test cylinders. 8—Compressor unit connected to moist room and mixing room

Laboratory layout of Republic Portland Cement Co., San Antonio, Texas. Temperature and humidity controls were recently installed



Hints and Helps for Superintendents

Saves Coal-Grinding Power

(Anonymous)

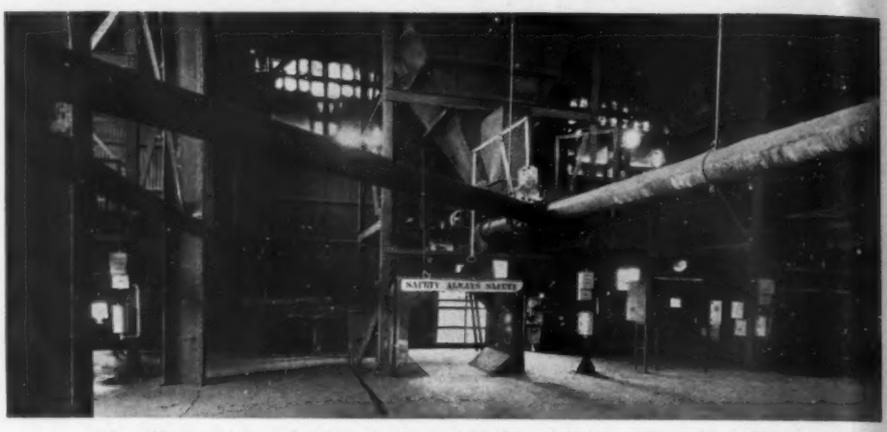
LEHIGH PORTLAND CEMENT CO., Birmingham, Ala., has operated only its No. 1 and No. 4 kilns in the last few years. Each kiln is fed pulverized coal from an individual bin and Fuller mill by means of a 10-in. pipe to the kiln.

In order to keep a kiln operating all day, it would be necessary to have the coal-grinding mill operating during the day as well as at night, as there is not sufficient storage in any one bin to keep the kiln which it feeds operating all day.

The power demand for electricity, which is bought from the Alabama Power and Light Co., is considerably higher in the day with the quarry, raw mills and coal pulverizers operating. The highest power demand reading for any single day determines the rate paid for that month.

The company conceived an idea to equalize the power demand for day and night and thus to reduce the power demand. A hole was cut in the 10-in. pipe from the No. 2 bin to the No. 2 kiln near the bin end, and another 10-in. pipe was welded to this pipe and was passed diagonally across the room and similarly tapped into the 10-in. pipe on kiln No. 1 at the kiln end. A similar arrangement was made for the No. 3 and No. 4 kilns. Ordinary sliding gate valves (12x18-in. plate) were inserted to open or close each pipe at the joints.

Now all the coal grinding takes place at night and enough coal is stored to last throughout the next day, thus keeping the *daily* power demand down, and it is balanced more at night. Now No. 1 kiln can be fired from its own bin, and when the supply of coal is exhausted, proper opening and closing of gate valves will enable it to use coal from No. 2 bin. No. 3 and No. 4 operate similarly. Coal is pulverized the following night again.



Auxiliary 10-in. pipe leads from bin No. 2 leftward to kiln No. 1

Increases Life of Cable

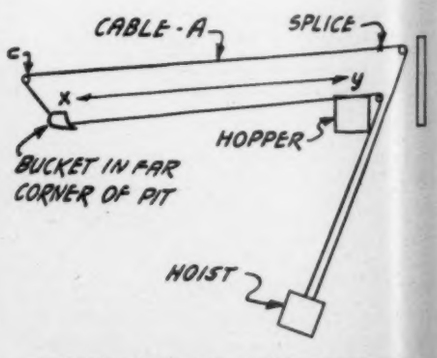
By Harold V. Martz
Franklin, Ohio

IN YOUR "Hints and Helps for Superintendents" department of ROCK PRODUCTS you have invited suggestions on time- and money-saving devices around stone and gravel plants.

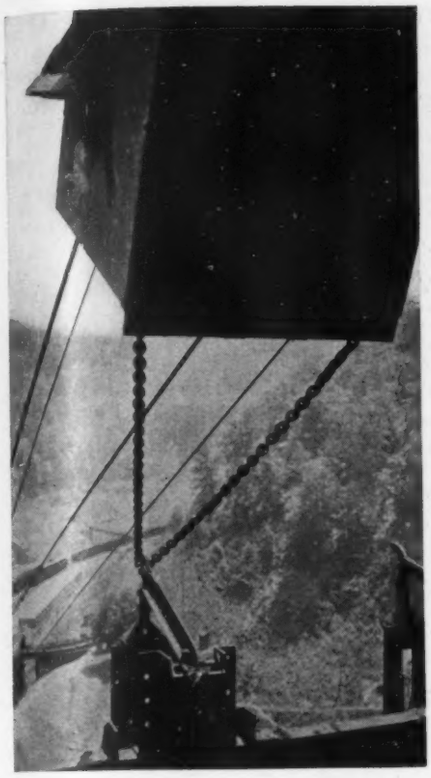
We have found two simple ideas that have saved several dollars on wire rope costs. The bucket end of a cable, on drag scrapers, wears faster than the drum end. Our former practice was to cut off the worn end until the cable got too short to use. Now, however, when the bucket end shows considerable wear, we turn the cable end for end (that is, transfer the bucket end to the drum). Thus it is possible to wear out the whole length of cable and keep its full length at the same time.

Another idea concerns that pull-back cable, which is a one-piece length. By splicing with clamps, and placing the splice in a certain position, so that short lengths of cable can be used, cable service can be lengthened. The splice must operate between the sheave wheels. The accompanying sketch illustrates the idea. A worn pull-in cable may be used for Cable *A* in the sketch. The sketch may look a little hazy, but this idea has deferred our purchase of a new pull-back cable for quite some time. As the distance *x* to *y* is less than the distance from the splice to *c*, the splice does not have to pass the sheaves.

Pulverized coal pipe to kiln No. 1 at right and kiln No. 2 at left



Splice increases cable service



Loop of chain from bucket catches on a hook to facilitate dumping

Electric Equipment for Automatic Slope Hoists

By R. F. Emerson,
Industrial Engineering Department,
General Electric Co.

A SLOPE HOIST is sometimes used for disposing of the overburden in quarries or the waste material from mines. Very often an operator is on constant duty at the hoist, manipulating a switch or controller for every trip made by the hoist. If the hoist receives material by means of a dump car, another attendant is necessary to keep the hoist supplied with the waste material. If the equipment is in operation 24 hours a day, it means the constant attention of two men.

In one such instance, a long step forward was made by changing the slope hoist from manual control to full automatic operation and installing a bin or hopper large enough to receive a surplus of material during the daytime to keep the hoist running during the night. This new arrangement made it possible to dispense with the services of the hoist operator, and the dump car required the services of an operator only during the daytime.

Automatic slope hoists can be made to give excellent operation, although to get the best results a full knowledge of all the operating conditions is necessary before applying the electric motors and control. Full details in regard to angle of incline, hoisting speed, weight of bucket and material carried are very essential, to say nothing of information as to how the bucket receives its load and how the load is dumped. Very often the question of accurate slowing up and stopping in the last 10 ft. of travel is infinitely more important than starting up and running the rest of the distance. This problem is usually occasioned by the method of dumping the bucket.

The illustration shows a bucket of waste material from a quarry having just been dumped by means of a loop of chain from the bucket catching on a hook. This is a balanced slope hoist where a full bucket starts up grade when the empty bucket starts down. The illustration shows a second hook used for dumping the other bucket on the next trip. Obviously, the electric control must be designed so that the bucket chain does not engage the hook at too high a speed; also the bucket must not coast too far and damage either itself or the head pulley. The inertia of the whole moving system—including material handled, buckets, cables, pulleys, gear reducers, and rotor of the driving motor itself—will affect the problem. Full information such as this, furnished to the electrical engineer before the hoist is installed, usually means that proper equipment can be recommended and insures that the hoist will go into service with minimum of delay.

In order to obtain an accurate stop, the driving induction motor may be slowed down by inserting resistance in its secondary. When the speed has been reduced sufficiently, power is cut off and the brake sets, or the motor is reversed for the return trip. This method has one disadvantage, in that the amount of "slow-down" obtained varies with the load. If very accurate stopping is necessary, this method may prove unsatisfactory. A more accurate method would be to use a two-speed motor or two separate driving motors, one of which starts up and carries the load at high speed and the other carries the load at a very low speed during the last few feet of travel. Whichever method is used will be determined by the actual conditions of operation.

Carbide Protector

USERS OF CARBIDE, those who generate their own acetylene, or those who use carbide for their source of light in underground operations, are generally aware of the property carbide has to effloresce when exposed to the air. "Keep the lid on the carbide can," is the constant cry, for leaving the lid off the carbide can will cause the carbide to "slack" in air and become worthless.

Western operators have found that if about a pint of coal oil (kerosene) is added to a 100-lb. drum of carbide, the oil forms a protective film over the carbide grains and effectively prevents efflorescence. The coal oil can be added with an ordinary fly spray or it can be poured directly into the drum and the contents rolled until each grain is wetted.

The coal oil does not hamper the generation of acetylene when water is added in any way, and makes it possible to use every pound of the carbide without loss.

Slows Up Feed to Screen

By J. A. Buechler,
Superintendent, Saxet Sand and Gravel Co.,
Victoria, Tex.

THE DEVICE ILLUSTRATED is a used, or discarded, pump shell, connected to discharge pipe 8 ft. back and about 4 ft. above intake end of our 4 ft. by 12 ft. rotary scalping screen. This arrangement slows down the force of the water and material coming out of discharge pipe; the same will drop practically straight down into flume. From there material will flow slowly into the receiving end of rotary scalping screen.

It avoids all rushes of water and material going into scalping screen; and in our case has overcome the trouble of plugging up of discharge line 100%. At the discharge end, the hopper, which acts as a surge tank, can be used for adding any remix that has to be rewashed; and also to add spillage from the plant, as it follows the regular channels of manufacture for the material coming from the dredge.

Discarded pump shell slows down force of water from discharge pipe of rotary scalping screen

RECENT QUOTATIONS ON ROCK PRODUCTS SECURITIES

Stock	Date	Bid	Asked	Dividend
Allentown P. C., com.[47]	2-19-36	4	6	
Allentown P. C., pfd.[47]	2-19-36	6	8	
Alpha P. C., com	2-21-36	21⅞	22½	.25 (qu.) Apr. 25
American Aggregates, com.[48]	2-19-36	1	2	
American Aggregates, pfd.[48]	2-19-36	3	6	
American Aggregates, 6's 1st mtg. 3/6's, 1943, new bonds[48]	2-19-36	45	....	
American Aggregates, 6's, 1943, old bonds[48]	2-19-36	45	....	
American L. and S., 1st 7's[48]	2-19-36	103	....	
Arundel Corp., com	2-21-36	19⅝	21	
Ashgrove L. & P. C., com.[47]	2-19-36	13	15	
Ashgrove L. & P. C., pfd.[47]	2-19-36	96	99	
Bessemer L. and C., Class A[47]	2-19-36	5	6	
Bessemer L. and C., 1st 6½'s, 1947[48]	2-19-36	50	....	
Bessemer L. and C., cert. of dep., 1947[48]	2-18-36	60	62	
Boston S. and G., com	2-26-36	1	actual sale*	
Boston S. and G., new 7%, pfd.[37]	2-19-36	8	10	
Boston S. and G., 7's, 1939[37]	2-19-36	70	....	
Calaveras Cement, com.[40]	2-18-36	5	6	
Calaveras Cement, 7% pfd.[40]	2-18-36	80	84	1.00 (ac.) Mar. 1
California Art Tile, A[9]	2-20-36	5¼	6	.25 Mar. 1
California Art Tile, B[9]	2-20-36	3	3½	
Canada Cement, com.[42]	2-18-36	7⅝	7¾	
Canada Cement, pfd.[42]	2-18-36	71½	74	
Canada Cement, 5½'s, 1947[42]	2-18-36	106	106¾	
Canada Crushed Stone, 6½'s, 1944[42]	2-18-36	92	....	
Certainteed Products, com	2-21-36	15½	16⅛	
Certainteed Products, pfd.	2-21-36	86	actual sale	
Certainteed Products, 5½'s, 1948	2-21-36	98	98⅝	
Consol. Cement, 1st 6's, 1950[46]	2-19-36	83	85	
Consol. Cement, A[47]	2-19-36	6	7	
Consol. Oka. S. and G. (Can.), 6½'s, 1948[42]	2-18-36	15	25	
Consol. S. and G., pfd.[42]	2-18-36	32	....	
Consol. Rock Products, units[46]	2-19-36	1	1½	
Construction Mat., com	6-12-35	6c	actual sale†	
Construction Mat., pfd.	6-12-35	12c	actual sale‡	
Consumers Rock & Gravel, 1st mtg. 6½'s, 1948[47]	2-19-36	20	22	
Coosa P. C., 1st 6's[47]	2-19-36	25	30	
Coplay Cement Mfg., pfd.[47]	2-24-36	14	16	
Coplay Cement Mfg., 6's, 1941[47]	2-19-36	70	73	
Cumberland P. C., 7's, 1937[47]	2-19-36	80	85	
Dewey P. C., com.[47]	2-19-36	40	50	
Dolese and Shepard	2-20-36	29	31	
Dufferin Pav. and Cr. Stone, pfd.[42]	2-18-36	77	....	
Federal P. C., 6½'s, 1941[47]	2-24-36	26	30	
Fla. Port. Cement, 6½'s, 1937[48]	2-18-36	100	....	
Fla. Port. Cement, units[47]	2-19-36	24	25	
Giant P. C., com.[47]	2-19-36	3	5	
Giant P. C., pfd.[47]	2-19-36	15	19	
Gyp. Lime & Alabastine, Ltd.	2-21-36	7⅞	actual sale	
Gyp. Lime & Alabastine, 5½'s, 1948[47]	2-19-36	94	97	
Hawkeye P. C., cap.[47]	2-19-36	30	35	
Hercules Cement, com[47]	2-19-36	30	35	
Hercules Cement, pfd.[47]	2-19-36	80	85	
Hermitage Cement, com.[47]	2-19-36	16	20	
Hermitage Cement, pfd.[47]	2-19-36	92	97	
Ideal Cement, 5's, 1943[47]	Called for payment			
Ideal Cement, com	2-24-36	61	63	
International Cement, com	2-21-36	45⅞	46⅝	.37½ (qu.) Mar. 27
International Cement, conv. deb., 4's, 1945	2-21-36	121	132	
Kelley Island L. and T.	2-21-36	25½	actual sale	
Ky. Cons. Stone, 6½'s, 1938[47]	2-19-36	15	19	
Ky. Cons. Stone, com.[47]	2-19-36	1	2	
Ky. Cons. Stone, pfd.[47]	2-19-36	3	5	
Ky. Cons. Stone, 1st mtg. 6½'s[48]	2-18-36	20	25	
Ky. Rock Asphalt, 6½'s, 1935[47]	2-19-36	30	40	
Lawrence P. C.	2-18-36	18	20	
Lawrence P. C., 5½'s, 1942[47]	2-19-36	99	101	
Lehigh P. C., com	2-21-36	19	19¾	
Lehigh P. C., 7% pfd.	2-21-36	113½	115	
Louisville Cement[47]	2-19-36	90	95	
Lyman-Richey 1st 6's, 1935[47]	2-19-36	15	20	
Marbelite Corp., com. (cement pts.)[40]	2-18-36	20c	30c	
Marbelite Corp., pfd.[40]	2-18-36	3¾	4½	
Marblehead Lime, 7's, 1944[14]	2-18-36	95	98	
Marquette Cement, com.[47]	2-19-36	27	30	
Marquette Cement, pfd.[47]	2-19-36	95	98	
Material Service Corp.[47]	2-19-36	6	8	
McCrady-Rodgers, com.[47]	2-19-36	6	8	
McCrady-Rodgers, 7% pfd.[47]	2-19-36	35	40	
Medusa P. C., com.[47]	2-19-36	17	20	
Medusa P. C., pfd.[47]	2-19-36	50	55	
Michigan L. and C., com.[47]	2-19-36	50	55	

RECENT QUOTATIONS ON ROCK PRODUCTS SECURITIES

Stock	Date	Bid	Asked	Dividend
Missouri P. C.	2-21-36	12½	13¼	
Monarch Cement, com.[47]	2-19-36	95	100	
Monolith P. C., com.[9]	2-20-36	2½	3¼	
Monolith P. C., 8% pfd.[9]	2-20-36	5¾	6½	
Monolith P. C., units[9]	2-20-36	14	16¼	
Monolith P. C., 1st mtg. 6's[9]	2-20-36	101	103	
Monolith Portland, Midwest, pfd.[9]	2-20-36	1⅝	1⅞	
National Gypsum A., com.[47]	2-19-36	59	60	
National Gypsum, pfd.[47]	2-19-36	105	107	
National Gypsum, 6's[47]	2-19-36	105	106	
National L. and S., 6½'s, 1941[47]	2-19-36	55	58	
Nazareth Cement, com.[47]	2-19-36	7	9	
Nazareth Cement, pfd.[47]	2-19-36	60	65	
Newaygo P. C., 7% cum. pfd.[47]	2-19-36	50	60	
Newaygo P. C., 1st 6½'s, 1938[48]	2-18-36	96	98	
New England Lime, units[14]	2-18-36	4	8	
N. Y. Trap Rock, 1st 6's, 1946	2-21-36	92	94	
N. Y. Trap Rock, 6's, stamped, 1946	2-21-36	90⅝	94½	
N. Y. Trap Rock, 7% pfd.[48]	2-18-36	10	15	
North Amer. Cement, 1st 6½'s, 1953[47]	2-19-36	32	33	
North Amer. Cement, 6½'s, 1943[47]	2-19-36	86	89	
North Amer. Cement, 6½'s, 1940[47]	2-19-36	55	57	
North Amer. Cement, "A"[46]	2-19-36	1	2	
North Amer. Cement, "B"[46]	2-19-36	5	6	
North Shore Mat. 1st 6's[47]	2-19-36	35	40	
Northwestern Port. Cem. units[9]	2-20-36	50	55	
Northwestern States P. C.[47]	2-19-36	23	26	
Ohio River S. and G., com.	2-20-36	1	....	
Ohio River S. and G., 1st pfd.	2-20-36	60	....	
Ohio River S. and G., 2nd pfd.	2-20-36	3½	5	
Ohio River S. and G., 6's[48]	2-18-36	10	12	
Oregon P. C., com.[47]	2-19-36	3	4	
Oregon P. C., pfd.[47]	2-19-36	75	80	
Oregon P. C., conv. pfd.[47]	2-19-36	30	35	
Pacific Coast Agg., new com.[40]	2-18-36	3½	4	
Pacific P. C., com.[40]	2-18-36	4	5	
Pacific P. C., pfd.[40]	2-18-36	40½	42	
Peerless Cement, com.[47]	2-19-36	1	2	
Peerless Cement, pfd.[47]	2-19-36	4	5	
Penn.-Dixie Cement, com	2-21-36	6⅝	7⅛	
Penn.-Dixie Cement, pfd. A	2-21-36	41½	42⅝	
Penn.-Dixie Cement, 6's A, 1941	2-21-36	96⅝	98⅞	
Penn. Glass Sand Corp., com.[47]	2-19-36	15	16	
Penn. Glass Sand Corp., pfd.[47]	2-19-36	113	115	3.50 (qu. & ac.) Apr. 1
Penn. Glass Sand Corp., 6's[47]	2-19-36	103	104	
Petoskey P. C., 6's, 1941[48]	2-19-36	93	....	
Petoskey P. C., 6's, 1935-38[48]	2-19-36	95	....	
Petoskey P. C., com.[48]	2-19-36	4	4¾	
Republic P. C., 6's, 1943[47]	2-19-36	95	97	
Riverside Portland Cement, A[9]	2-20-36	8½	9½	
Riverside Portland Cement, B[9]	2-20-36	1¾	2½	
Riverside Portland Cem., pfd.[9]	2-20-36	86	88	
Rockland and Rockport Lime, 1st pfd.[47]	2-19-36	4	6	
Santa Cruz P. C., com.[9]	2-20-36	33	35	
Schumacher Wallboard, com.[9]	2-20-36	4½	5½	
Schumacher Wallboard, pfd.[9]	2-20-36	18¾	20	
Signal Mt. P. C., units[47]	2-19-36	40	45	
Southwestern P. C., units[46]	2-18-36	115	....	
Spokane P. C., units[47]	2-19-36	8	10	
Standard Paving & Mat. (Can.), com.[42]	2-18-36	2½	2¾	
Standard Pav. & Mat., pfd.[42]	2-18-36	13½	....	
Superior P. C., A[40]	2-18-36	44	46	.55 (ac.) Mar.2
Superior P. C., B[40]	2-18-36	11	13	
Trinity P. C., units[47]	2-19-36	22	25	
U. S. Gypsum, com	2-21-36	106½	108	
U. S. Gypsum, pfd	2-21-36	167¾	....	
Volunteer P. C., 1st 7's, 1942[47]	2-19-36	97	100	
Volunteer P. C., com.[47]	2-19-36	3	5	
Vulcanite P. C., com.[47]	2-19-36	5	7	
Vulcanite P. C., 7½'s, 1943[47]	2-19-36	97	100	
Wabash P. C.[47]	2-19-36	8	10	
Warner Co., ww. 1st 6's, 1944[47]	2-19-36	80	81	
Warner Co., com.[47]	2-19-36	4	5	
Warner Co., pfd.[47]	2-19-36	13	15	
Whitehall Cement Mfg., com.[47]	2-19-36	35	40	
Whitehall Cement Mfg., pfd.[47]	2-19-36	65	70	
Wisconsin L. & C., 1st 6's, 1940[47]	2-19-36	65	68	
Wolverine P. C., com.[47]	2-19-36	5	6	
Yosemite P. C., A. com.[48]	2-18-36	3⅛	3¾	

Quotations by: [9]A. E. White Co., San Francisco, Calif. [14]The Securities Co. of Milwaukee, Inc., Milwaukee, Wis. [37]Wise, Hobbs & Seaver, Inc., Boston. [40]Martin Judge, Jr., and Co., San Francisco, Calif. [42]Nesbitt, Thomson & Co., Toronto. [46]First National Bank of Chicago, Chicago, Ill. [47]Anderson Plotz and Co., Chicago, Ill. [48]Hewitt, Ladin & Co., New York, N. Y.

† 60 shares sold at auction, at New York, N. Y.
‡100 shares sold at auction, at New York, N. Y.
* 16 shares sold at auction, at Boston, Mass.

Recent Dividends Announced

		1936
Alpha Portland Cement Co., com. (quar.)	$0.25	Apr. 25,
Calaveras Cement, pfd. (accum.)	1.00	Mar. 2
International Cement, com. (quar.)	.37½	Mar. 27
California Art Tile, A (resumed)	.25	Mar. 1
Signal Mt. P. C., pfd. (semi-annual)	2.00	Feb. 15
Penn.-Glass Sand, pfd. (quar.)	1.75	Apr. 1
Penn.-Glass Sand, pfd. (accum.)	1.75	Apr. 1
Superior P. C., A (accum.)	.55	Mar. 2

Giant Portland Cement Co., Philadelphia, Penn., reports for the years ended December 31, profit and loss statement as follows:

	1935	1934
Operating profit	$40,276	$ 11,113
Depreciation	87,525	101,894
Loss on dismantling machinery	.....	4,911
Sack obsolescence residue.	.....	25,000
Deficit for year	47,249	120,691

Cash assets on December 31, 1935, were $278,063 against $246,445 on the same date, 1934: Total current assets $642,483; current liabilities, $27,637.

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Arundel Corp., Baltimore, Md., sand and gravel producer and general contractor, reports for the years ended December 31, income account:

	1935	1934
Operating income	$ 695,425	$834,653
Federal taxes	97,800	106,168
Net income	597,625	728,485
Dividends	483,818	486,068
Surplus for year	113,807	242,417
Surplus, January 1	2,104,528	1,839,272
Surplus adjustments	.....	*(cr)22,838
Surplus, December 31	†2,218,335	2,104,528

*Restoration of reserve for insurance to surplus, $174,678; less premiums paid on 8,705 treasury shares previously acquired, $151,840; balance, $22,838.

†Including $87,050 representing common stock in treasury.

On December 31, 1935, current assets amounted to $2,575,670, of which $346,145 was cash and $1,052,150 marketable securities; current liabilities amounted to $890,065.

Joseph V. Hogan, president, told stockholders that uncompleted contracts of the company's books at the beginning of this year amounted to $6,219,461. This compares with $7,308,995 a year ago. Mr. Hogan said when considering the fact that about $1,000,000 of last year figure was represented by work on the Livingston channel contract, which had to be performed at a loss, the comparison is favorable for 1936. Total construction work completed during the year amounted to $6,737,570. H. O. Firor was elected a director to fill the vacancy caused by the death of John T. Waldhauser.

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American Lime & Stone Co., Bellefonte, Penn., filed a registration statement with the SEC covering $250,000 of 5% first mortgage serial and sinking fund bonds maturing September 1, 1936, to March 1, 1941, and $750,000 or 5½% first mortgage serial sinking fund bonds, series maturing March 1, 1951.

Proceeds will be used as follows: $600,000 for the payment of bank loans; $310,000 to retire 3500 shares of 6% preferred stock; and $45,500 to reimburse working capital.

Profit and loss statement of the company for the year ended December 31, 1935, showed net income of $31,698 after all charges, provision for federal income tax, etc., compared with net income of $72,559 in 1934 and $25,968 in 1933.

Total net sales last year were $967,802 as against $884,297 in 1934 and $717,667 in 1933.

Balance sheet as of December 31, 1935, showed total assets of $2,183,721, and current assets of $314,459 compared with current liabilities of $56,951.

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North American Cement Corp., Albany, N. Y., reported for year ended December 31, 1935, a net loss of $549,716 after taxes, interest, depreciation, depletion and other deductions, comparing with net loss of $138,840 in 1934.

Current assets as of December 31, 1935, including $663,131 cash, amounted to $1,403,444 and current liabilities were $138,569. This compares with cash of $658,450, current assets of $1,411,045 and current liabilities of $294,650 at end of preceding year. Inventories were $672,356 against $631,324.

Total assets of the corporation as of December 31, last, aggregated $11,512,309 compared with $12,112,326 at close of 1934. Capital surplus was $6,150,072 and deficit from operations was $1,074,033 compared with capital surplus of $6,149,667 and deficit from operations of $524,317 on December 31, 1934.

Capital stock consists of 79,450 shares (par $1) of Series A convertible prior preference, 50,650 shares (par $1) of Series B convertible prior preference 10,779 shares (par $1) of preferred and 18,891 shares (par $1) of Class A common stock. Funded debt amounted to $5,376,975 against $5,502,350 at close of 1934.

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Consolidated Rock Products Co., Los Angeles, Calif.: Stockholders representing approximately 22% of the 683,402 shares of preferred and common shares outstanding, have organized a stockholders' protective committee to investigate the present condition of the company's affairs. The company has been operating under the provisions of section 77-B of the National Bankruptcy Act since May, 1935.

A temporary stockholders' committee, headed by Horace G. Miller, treasurer, District Bond Co., called the meeting. Besides Mr. Miller, the temporary committee members were Lee Champion, S. E. Lambert and Earl Johnson. This committee was elected to permanent status at the meeting and enlarged to include three additional members. Added to the committee were C. H. Tanner, Edward E. Hatch and Louis Van Gelder.

The committee members will serve without compensation, and it is instructed to examine the present condition of the company; to recommend to the present management any plan of reorganization it deems advisable; to represent stockholders in any program of reorganization of the concern; and to keep stockholders informed of developments in the company's affairs.

Formation of the stockholders' committee creates the third group of investors organized to date to watch over the company's affairs. Two bondholders committees have been active for some time. Directors of the company stated early this month they were endeavoring to work out a plan of reorganization satisfactory to all interests and hoped that some plan could be put into effect this year.

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United States Gypsum Co., Chicago, Ill., and subsidiaries, report for year ended December 31, 1935, a consolidated net income of $3,491,252 after depreciation, depletion, federal taxes, loss on retirement of plant assets, etc., equivalent after 7% preferred dividend requirements, to $2.47 a share (par $20) on 1,192,103 shares of common stock, outstanding at close of the year.

This compares with $2,155,368, or $1.35 a share, on 1,193,082 common shares in 1934.

Current assets as of December 31, 1935, including $14,001,153 cash and marketable securities, amounted to $21,184,236 and current liabilities were $1,913,501 compared with cash and marketable securities of $14,003,628, current assets of $20,140,715 and current liabilities of $1,297,884 at end of preceding year.

Sewell L. Avery, president, said residential building activity in 1935 reflected a substantial increase as compared with the previous year, and there are indications that the improvement in volume will extend into this year.

Expenditures for plant additions and improvements during 1935 totaled $2,376,204.

Gypsum's indicated net income for the second six months of 1935 was more than 14% greater than that reported for the first half year. In recent years profits for the second half have been somewhat less than those for the first. The broad construction increase which continued until late in December, particularly that in connection with residential building and modernization, made possible this reversal in profit trend.

Consolidated income account for year 1935 compares as follows:

	1935	1934
Earnings after expenses	$5,547,341	$3,766,772
Other income	405,896	566,806
Total income	$5,953,237	$4,333,578
Depreciation and depletion	1,917,557	1,834,187
Federal taxes	458,362	218,395
Other deductions	86,066	125,627
Net income	$3,491,252	$2,155,369
Preferred dividends	547,554	547,547
Common dividends	2,085,447	1,487,661
Surplus	$858,251	$120,161

TRAFFIC and TRANSPORTATION

Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week of February 15:

New England

38158. **Import rough quarried granite,** carload, minimum, weight 50,000 lb., from Portland, Me., to Beebe Jct., Que., proposed, 22½c per 100 lb. (To place Portland on a parity with ports of Halifax and St. John.)

Trunk

33888 (Sup. 2). **Ganister stone,** not ground, C. L. (See Note 2), to Sandusky, O., from Barree, Brookes Mills, Penn., 16c; Cumberland, Md., 16c; Berkeley Springs, W. Va., 17c; Flowing Spring, Hannah, Harbison Walker Ref. Co., No. 16, Madley, Penn., 16c; Mt. Union, Reedsville, Penn., 17c, and Wolfsburg and Moores Mills, Penn., 16c per 100 lb.

Sup. 1 to 34350. **Chert,** in Virginia, carload (See Note 2), from McCoy to Blackstone, $1.70; Buchanan, $1.20; Cheriton, $2.20; Chilhowie, $1.40; Crimora, $1.60; Elkton, $1.70; Ellerson, $1.80; Exmore, $2.20; Harrisonburg, $1.60; Kenbridge, $1.39; Lynchburg, $1.40; Milford, $1.90; Mt. Jackson, $1.70; Roanoke, 88c; Staunton, $1.60; Suffolk, $1.76, and Winchester, $1.90 per net ton.

34409. **Sand and gravel** (other than ground or pulverized or naturally bonded molding), in open top cars, C. L. (See Note 3), but not less than 60,000 and 80,000 lb., respectively, in closed and open top cars, from Machias, N. Y., to Jamestown, N. Y., $1 per net ton, plus emergency charge.

34431. (A) **Sand** (except industrial), and/or **gravel,** in open top cars. (B) **sand** (other than ground or pulverized or naturally bonded moulding), in open top cars, without tarpaulin. (C) **sand** (other than ground or pulverized), in closed cars; **sand,** naturally bonded moulding, in open or closed cars (See Note 2), from Buffalo stations, N. Y.

(Destinations)	(A)	(B)	(C)
Erie, Penn.	120	120	140
Olean, N. Y.	100	100	120
Arcade, N. Y.	70	70	100
Nunda, N. Y.	110	110	130
Mt. Morris, N. Y.	110	110	130
Rochester, N. Y.	110	110	130
Bradford, Penn.	100	100	130
Mayville, N. Y.	90	90	120
Sherman, N. Y.	90	90	130

Rates in cents per net ton, for P. R. R. delivery only. Cancel remaining destinations from Buffalo stations, N. Y., with exception of Williamsport, Penn., and Portageville, N. Y.

34439. To amend carload minimum weight governing rates on **coated crushed stone** from Marion, Roanoke and Norfolk, Va., and Hagerstown, Md., as published in N. & W. Tariffs I. C. C. 8558, 8635, 8657 and 8733 (See Note 3), but not less than 60,000 and 80,000 lb., respectively, in closed or open top cars.

34448. **Slag,** in box or open top cars, carload (See Note 2), from Buffalo, Niagara Falls and Suspension Bridge, N. Y., to Carteret, N. J., 21c per 100 lb., subject to emergency charge. Proposed rate is comparable with rate on pig lead between same points.

34464. **Gravel and sand,** other than ground or pulverized or naturally bonded moulding, in open top cars, without covering, carload, (See Note 3), but not less than 60,000 or 80,000 lb., respectively, in closed or open top cars, from Pittsburgh, Coleman, New Kensington, McKeesport, Aspinwall and Munhall to Allenton to Saltillo, Penn., $1.95, and to Fairview to Alvan, Penn., $2.20 per net ton, plus emergency charge.

M-3465. To establish rate of $2.40 per net ton on **sand** (other than ground or pulverized or naturally bonded molding) and **gravel,** in open top equipment without tarpaulin, C. L., from Bowmanstown and Palmerton, Penn., to Suspension Bridge, Buffalo and Niagara Falls, N. Y.

Central

45673. To cancel commodity rates on **crushed stone,** C. L., from Cleveland (ex-lake), O., to Barberton, O., 80c net ton; from Cleveland, O., to Barberton and Cuyahoga Falls, O., 4½c. Classification basis to apply.

45703. To establish on **crushed stone** and **crushed stone screenings,** in bulk, in straight or mixed carloads, from Marion, O., to Ashley, 60c; Bucyrus, Climax, Edison, 50c; Fulton, 60c; Mt. Gilead, 50c; Marengo, 60c, and New Winchester, O., 50c per net ton. Route—Via C. C. C. & St. L. Ry. to Ashley and via C. C. C. & St. L., Martel, N. Y. C., to other points.

45739. To establish on **stone,** crushed, and **crushed stone screenings** (in bulk), in open top cars, carload, from Spore, O., to Ashley, Cardington, 60c; Galion, 50c; Leonardsburg and St. James, O., 60c per net ton. Route: Via N. Y. C., Martel, and C. C. C. & St. L. to Galion and via N. Y. C., Edison, C. C. C. & St. L. to remaining points.

45783. To establish on (A) **sand,** naturally bonded moulding, in all kinds of equipment, carload; (B) sand, ground or pulverized, in all kinds of equipment, carload, and (C) sand (except naturally bonded moulding; ground or pulverized sand, in open top equipment), carload (See Note 3), but not less than 60,000 lb. and 80,000 lb., respectively, in closed and open top cars.

(Rates in cents per net ton.)

FROM KENT AND BRADY LAKE, O.

To	A	B	C
Albion, Mich.	200	220	185
Battle Creek, Mich.	210	231	200
Detroit, Mich.	180	198	145
Elkins, Ill.	290	319	290
Grove City, Penn.	150	165	130
Marshall, Mich.	200	220	185
South Greensburg, Penn.	160	176	140

To Dayton and Springfield, O., 145; Toledo, O., 115.

45822. To establish on **limestone,** ground or pulverized, or **limestone dust,** unburnt, in packages, in box cars, C. L., from Ridgeville, Ind., to Fort Wayne, Dublin, 95c; Auburn, 115c; Albion, Ind., 125c per net ton. Route—Via P. R. R. direct.

45823. To establish on (A) **sand,** naturally bonded moulding, in all kinds of equipment, C. L.; (B) **sand,** ground or pulverized, in all kinds of equipment, C. L., and **sand** (C) (except naturally bonded moulding, ground or pulverized sand), and **gravel,** in open top equipment, C. L. Proposed rates on gravel to apply only from Phalanx, O., from M. & S. Valleys group (rates in cents per net ton):

To	A	B	C
New Rochelle, N. Y.	300	330	300

Plus 70c for movement through New York Harbor.

45850. To establish on **limestone,** agricultural, unburnt, ground or pulverized, C. L., minimum weight 60,000 lb., from Ridgeville, Ind., to Holland, Mich., 175c per net ton.

45866. To establish on **stone, crushed,** and **crushed stone screenings** (in bulk) in open-top cars, C. L., from East Liberty, O., to Kenton, Silver Creek, 60c; Belle Center, Richland, Huntsville, 50c; Mt. Victory, Marsh's, 60c; Big Springs, Rushsylvania, DeGraff, 50c; Pemberton, Sidney, Hardin, 60c; W. Liberty, Lippincotts, 50c; Urbana, Catawba, Mechanicsburg, 60c; Irwin, Milford Center, W. Marysville, Ostrander, 50c, and Delaware, O., 60c per net ton.

45875. To establish on **sand** (except industrial) and **gravel,** in open top cars, carloads, from Leeland, Ind., to LaPaz, Ind., 55c per net ton.

Southern

10507 (Amdt. 1). Provide rate of 320c per net ton, from Birmingham, Ala., to Palestine, Texas on **slag, crushed or ground, coated with road oil or asphalt,** not less than 50,000 lb.

10750. Establish a rate of 150c per net ton on **sand and gravel,** C. L. (See Note 3), from Carrollton, Ky., to Morehead, Ky., on intrastate traffic.

10751. Establish rate of 395c per net ton on **sand** on (1) and 5c per net ton lower on (2), from Millington, Oregon, Ottawa, Utica and Wedron, Ill., to Birmingham, Bessemer, Boyles, East Birmingham, Ensley, Fairfield, North Birmingham and Tarrant, Ala.:

(1) Sand, naturally bonded moulding, in all kinds of equipment; sand (except sand, naturally bonded moulding; ground or pulverized) in closed equipment.

(2) Sand (except naturally bonded moulding; ground or pulverized) in open top equipment.

(See Note 3), but not less than 60,000 and 80,000 lb., respectively, in closed and open top cars.

10851. Establish truck competitive rates, where not currently in effect, on **granite, marble or stone,** rough quarried or sawed, or hammered, chiseled, sand rubbed or slushed (finished surfaces protected by boxing or crating), L. C. L., to New Albany, Tupelo, Amory, Miss., and Sulligent, Ala. From Tate, Ga., 51½c; Ormewood station, Ga., 51½c; Rockton, S. C., 64c; Canton, Ga., 51½c; Charlotte, N. C., 64c, and Atlanta, Ga., 51½c per 100 lb., not subject to emergency charge.

10864. Establish rates based 50c per ton of 2000 lb. higher than present rates on **asphaltic sandstone** (processed), C. L., as in Item No. 303, in S. F. T. B. Tariff 206C, I. C. C. 1939, on bituminous rock, carloads, from Big Clifty, Black Rock, Bowling Green, Garfield, Leitchfield, Rockport and Summit, Ky., to destinations in Trunk Line and New England Freight Association territories.

10868. Establish rates in cents per 100 lb. on **mica, crude, scrap or waste, suitable for grinding purposes only,** C. L., min. wt. 60,000 lb., to Chicago, Ill., from Clanton, Ala., 32; Coopers, Ala., 33. Also reduce present rates from Clanton, Ala., to Louisville, Owensboro, Henderson, Ky., and Evansville, Ind., to 32c.

10869. Establish a rate of 425c per net ton on **phosphate rock,** not acidulated (acid phosphate) nor ammoniated, and **limestone, phosphatic,** straight or mixed carloads, minimum weight 40,000 lb., except (See Note 1) when less, from Mt. Pleasant, Tenn., to Paris, Ky.

Western

C-41-136. **Stone,** crushed; **rubble,** value at origin point not in excess of $4.50 per ton of 2000 lb.; **rip rap;** chatts (lead or zinc mine refuse); **strippings of stone quarries,** C. L. (See Note 3), but not less than 40,000 lb., from Sussex, Wis., to Des Moines, Ia. Proposed—12½c per 100 lb.

D-41-137. **Stone,** crushed; **rip rap stone; stone quarry strippings;** rubble stone, (See Note 3). From Dell Rapids, S. D., Pipestone, Minn., and Sioux Falls, S. D., to Bedford, Ia. Proposed—220c per net ton.

E-43-22. **Stone,** rough quarried, in rough blocks or sawed and not more than two sides, C. L. From Silverdale, Kan., to McDermott, O. Proposed—38c per 100 lb. (See Note 2).

Southwestern

7353. (a) To establish specific rates on **coated poultry grits,** in straight carloads or in mixed carloads with ground limestone, in barrels or bags, carloads, from Alton, Quincy, Ill., Carthage, Hannibal, White Bear, Mo., Weeping Water, Louisville and Omaha, Neb., and Alden, Ia., to W. T. L. territory, also to points in Arkansas and Oklahoma, minimum weight 50,000 lb. (b) In recording specific rates, fourth section to be observed by providing rates higher than scale, to protect rates to intermediate points via circuitous routes.

7376. **Stone and floor tile,** from, to and between the southwest and Kansas-Missouri territory. To establish Class D, or 22½% of first class; also floor tile, carloads, minimum weight 36,000 lb., between points provided with rates in Southwestern Lines' Tariffs 151-B, 152-C, 153-A, 154-D and 214-A.

7414. **Stone, crushed, ground or broken,** Quincy, Ill., to Houston, Tex. Establish $3.90 per ton of 2000 lb., from Quincy, Ill., to Houston, Tex. (See Note 3).

7487. Establish on **crushed rock,** Moline, Kan., to Ponca City, Okla., 76c, Burbank, Okla., 80c per net ton, similar reduction on **sand and gravel** from Arkansas City, Kan., and Oklahoma shipping points.

7499. To establish on **building stone,** rough quarried, minimum weight 50,000 lb., to Beaumont, Tex., from Colorado Springs, Colo., 36c, and from Manitou, Colo., 37c per 100 lb.

Illinois

8231. **Crushed stone,** crushed stone screenings, tailings, stone, rough (not dimension), rubble, rip rap and quarry scrap, in bulk, carload, (See Note 3), from East St. Louis district to N. Y. C. & St. L. stations: To Coffeen, Chapman, Fillmore, Bingham, Bayle, Ill., 88c per 100 lb.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

3950-9. To establish commodity rates on sand, C. L. (See Note 3), but not less than 60,000 and 80,000 lb., respectively, in closed and open top cars. Rates will not apply on silica (silex), tripoli and silica sand, powdered to such fineness that 90% or more will pass through a No. 100 mesh screen, in packages or in bulk. From Ottawa, Ill., to Elberon, Ga.: Rate per net ton, 455c. To Ball Ground, Ga., Canton, Ga., Nelson, Ga., Tate, Ga., 440c.

Texas-Louisiana

9865-TX. **Concrete mixture** (cemcrete), dry, in paper sacks, in mixed carloads with hydraulic, natural or portland cement, between points in Texas, also between Texas points and Shreveport group. Proposition from shippers:

(a) Apply to weight of concrete mixture the carload rate on cement. Weight of mixture not to be used to make up any deficit in weight on cement.

(b) Apply to weight of the cement (other than that in the concrete mixture), the carload rate on cement, observing minimum weight on cement published in various cement tariffs.

Mississippi Rate Increase Denied

A PROPOSED INCREASE in sand and gravel freight rates was denied Mississippi railroads by the State Railroad Commission at its January meeting. Agencies interested in road building had fought the increase on grounds that it would hamper the proposed road building program.

Lower Rates in Oklahoma

REDUCTION of 15c per net ton on the freight rates on sand and gravel from all Oklahoma producing points to Muskogee was made December 17 by the Oklahoma Corporation Commission. The lower rate was made in view of the anticipated movement of 100 carloads of sand and gravel to Muskogee for WPA projects.

Sand Rates Lowered in West Virginia

COMPLAINT of the Wells Pit Sand Co. and the Moundsville Sand Co. that B. & O. rates to the Tygarts valley dam construction were discriminatory has resulted in a public service commission order for lower rates. Effective March 1, the rates are not more than 85c a ton on sand and gravel shipped from Wells Pit to Grafton, and not more than 95c from Moundsville to Webster.

I. C. C. Hearing Called

THE I. C. C. will conduct a hearing at Charleston, S. C., March 9, on the application of the railroads to establish rates on crushed stone and gravel from South Carolina, Georgia and Alabama, to Charleston, Savannah, and Jacksonville without observing long-and-short-haul provisions.

Nebraska Rates Under Advisement

PROTESTS from shippers recently brought the question of rates on sand and gravel to the Nebraska state railway commission again, and it is now trying to work out a permanent rate structure to satisfy both carriers and shippers. The commission has vacated a former order fixing reductions of 15c per ton from Platte river pits to Omaha, 10c per ton from Platte river pits to Lincoln, and 5c per ton on all hauls under 70 miles.

Louisiana Rate Reduction Pending

THE LOUISIANA Public Service commission has taken under advisement a petition by the Charles Black Sand and Gravel Co. for experimental reduction in sand and gravel rates from producing points on the Illinois Central and N. O G. N. railroads to New Orleans.

I. C. C. Decisions

15984. Cement. By division 2. Parties to Curlett's I. C. C. No. A-211 authorized to establish a rate of $6.30 a net ton, plus emergency charges, from Martinsburg, W. Va., to Miami, Fla., minimum 60,000 lb., and to maintain limited higher rates from and to intermediate points.

I. and S. 4150. Sand and Gravel Surcharge. By division 4. Suggestion by carriers to revise emergency charges on sand, gravel, slag, crushed and broken stone, moving in interstate commerce within southern territory, was found not justified. The carriers had proposed to substitute for the authorized basis a flat increase of 5c on all interstate rates in excess of 60c a net ton.

23683. Crushed Stone. H. E. Fletcher Co. et al. vs. Boston & Maine et al. By the Commission. New finding is that rates on crushed or broken stone, grout, and riprap from West Chelmsford, Mass., and South Milford, N. H., to points in trunk line and New England territories are unreasonable to the extent they exceed scale, subject to addition of 20c a ton for movements over two or more line-haul carriers and of 70c a ton for hauls entailing carfloat service in the New York harbor district. The scale begins with 65c for 15 miles and under; becomes $1 between 40 and 60 miles; $1.20 between 80 and 100 miles; $1.65 between 175 and 200 miles, etc.; and ends with $3.15 between 530 and 560 miles, rates being on a minimum of 80,000 lb. Rubble was not included in the quarry waste group.

13731. Road Building Materials. By division 2. Supplemental report grants fourth section relief between points in southern territory so as to include rates from Key West, Fla., to points in Florida on materials imported from Cuba.

12172. Western cement, in connection with 8182, has been granted the same fourth section relief as that given in cement in the southwest and in and to New England. Modifying relief allowed earlier with reference to circuitous routes only, the Commission has granted provisional relief from the equidistant provision of section 4.

14999 and 16040. Cement from the southwest to the south. By division 2. Order 12180 issued to establish from producing points in Arkansas, Kansas, Missouri, Oklahoma, and Texas to points in Alabama, Georgia, Louisiana (east of the Mississippi River), Kentucky, Mississippi, and Tennessee, the lowest rates that may be constructed over any line. The relief shall not apply to circuitous lines falling within the 70, 50, and 33⅓% limitations.

15951. Ground or pulverized limestone in the south. By division 2. Order 12204 makes rates between southern territory and from points in Illinois to points in Mississippi Valley territory, in open-top cars, the lowest that may be constructed over any line from and to the same points set forth in Sand, Gravel, Slag, Stone, and Chert, 165 I C. C. 731, and to maintain higher rates between intermediate points. The relief is subject to the 50 and 70% circuity limitations and provides for differential of 25c a ton for short and weak lines, except the Black Mountain Railway Co.

26880. Feldspar. National Tile Co. et al. vs. Baltimore & Ohio et al. By division 4. Dismissed. Rates, carloads, points in North Carolina and Tennessee to Anderson, Ind., and Robinson, Ill., not unreasonable.

14716. Slag. By division 2. Defendants in National Slag Co. vs. Atlantic City Railroad Co. authorized, in fourth order No. 12008, to establish and maintain rates on slag over circuitous routes from points in Pennsylvania to destinations in trunk line and New England territories and between points in Pennsylvania over interstate routes, the same as those over direct routes, the relief being subject to the 50 and 70% circuity limitations.

15929. Soapstone and Talc. By division 2. Carriers, other than the Tennessee Central, authorized to establish, over all all-rail routes between points in Virginia and North Carolina and points in trunk line territory, including Buffalo-Pittsburgh territory, and New England territory, lowest rates that may be constructed on bases set forth, subject to combination limitation, and to maintain higher rates between intermediate points.

26838. Talc. Chemical Paper Manufacturing Co. vs. Boston & Maine et al. By division 2. Carload rate, talc, Hailesboro, N. Y., to Holyoke, Mass., unreasonable to the extent it exceeded 25c prior to December 3, 1931, and 20c on and after that date, minimum 60,000 lb. Shipments were made between August 16, 1931, and August 9, 1933. Reparation awarded.

21323 and 26176. Lime. Dann-Gerow Co., et. al., vs. A. C. L., et al.; and Dekle Lumber Co., et al., vs. Atlanta & West Point, et al. By the Commission. On lime, common, hydrated, quick or slack, from Genoa, Woodville and Gibsonburg, Ohio, to Clearwater and St. Petersburg, Fla., in case 21323, the Commission has modified findings for the future so that the rates would be unreasonable to the extent they might exceed $7.50 a net ton, minimum 30,000 lb., and $6, minimum 60,000 lb. The Dekle rates, in case 26176, were adjudged not unreasonable in the past but unreasonable for the future to the extent they might exceed $6.25 a net ton, minimum 30,000 lb., and $5, minimum 50,000 lb. from the Ohio points to Jacksonville, Fla.

Fourth Section Order 11977. Cement. By the Commission. Covering applications 14138, 462, 637, 12050, 13283, 13291, 13515, 13552, 13581, 13627, 13685, 13959, 14020, 14358 and 14447. Applicants authorized to maintain rates on cement from, to and between points in southwestern territory without observing the long-and-short haul part of section 4. The relief is subject to the 33⅓, 50 and 70% circuity limitations.

Proposed I. C. C. Decisions

26968. Ground Limestone. E. I. du Pont de Nemours & Co., Inc., vs. B. & O. et al. By Examiner C. W. Griffin. Rates, Engle, W. Va., and York and Annville, Penn., to Carney's Point, N. J., and from York to Gibbstown, N. J., and Hillside Junction, Penn., proposed to be found unreasonable to the extent they exceeded $1.75, $1.80 and $2.10 from Annville, York, and Eagle, respectively, to Carney's Point, and $1.85 and $2.05 from York to Gibbstown and Hillside Junction, respectively, minimum 60,000 lb., plus emergency charges which might have been in effect. Shipments were made between January 10, 1931, and December 31, 1934. Reparation proposed.

Lime Producers' Forum

Conducted by Victor J. Azbe,
Consulting Engineer, St. Louis, Mo.

Improving the Direct-Fired Lime Kiln

OPERATION of an ordinary direct-fired lime kiln is very wasteful. The main reason is intermittent firing of green coal on a very hot bed of coke. The heat of the coke raises the temperature of the green coal very rapidly, causing it to give off its volatile gaseous portion in a very short time. This volatile portion constitutes about one-third of the heat in the coal. It is very valuable when properly burned, but in most cases it is not used to any good advantage.

Air as Important as Fuel

Fuel without air does not develop heat. Now, while fuel supply to a furnace fluctuates in amount on account of the distilling of volatiles in the very short period of time, the air supply, unfortunately, is not even constant and when the most air is needed the least is obtained.

A kiln's normal capacity to handle gases is limited by the draft. Most small kilns have a very limited draft. They can handle a comparatively small volume and, as a result, capacity is low. The kiln has a fixed volume capacity of so much fuel and so much air. When these two are in the proper ratio the kiln will be fairly efficient. When one or the other is in excess, efficiency will be poor, and at the same time, and for the same reason, capacity will suffer.

There is a short time interval during every firing period when conditions are right. At other time intervals fuel may be in excess and later air is in excess. Right after firing of coal, conditions are particularly bad. The heat of the hot fire bed distills great quantities of gas from the green coal. This abnormal volume is more than the kiln can handle; and with this gas distilling off under pressure, the normal air supply entering kiln is reduced, and so when most is needed least is obtained. In fact, the volume of gas is so great that even much of this combustible gas is lost out through the door, as the kiln is incapable of handling the large volume.

As a result, direct-fired kilns have very low capacities, from as little as 5 to 10 or 12 tons. Fuel ratios range from 2 or 3 tons of lime per ton of coal; and the only way to improve this is to first improve draft and second to equalize combustible gas evolution and put it in step with the air supply.

Induced Draft

At one time the idea prevailed that draft could be induced only by fans. But fans require attention, they are expensive, need power, and under improper conditions may bring on other evils, as burning out of bearings, overheating and buckling when gases are very hot. Induced draft fans are, without question, the thing when conditions are right for them, but hardly so in a simple lime plant. And so one seldom found a fan on the typical small kiln, of which there are hundreds in the country, wasting coal at great rate and causing splotches of red on financial statements. But the writer developed the fact that draft on the ordinary kiln can be greatly bettered without fans, and what is more, that the effect of kiln height can be greatly increased without increasing the height of kilns.

Draft is produced in a lime kiln exactly as in any stack, in fact a lime kiln is a stack of large diameter, blocked to a considerable degree with stone. The flow through a chimney is, however, much faster than the flow through the upper storage zone of the kiln. Here the diameter is so large that the volume coming up can't fill the space. As a result air pours down into the storage zone in many places, while in some gas comes up. In many cases air goes down a long way; on very low capacity kilns even down into the shaft. In one case this down stream was traced for 20 ft.

Cold Air Infiltration from Top

It is quite natural for cold air to sink down into a hot kiln, as cold air is heavy and warm gases are light, and except the warm gases come up fast and with considerable effect, air will slip down past them.

The air on its travel will intermingle with the hot gases and come up again on the outer fringes of the hot stream. This has a deleterious effect in several different ways.

First: The storage zone is much cooler and where the air is coming down the stone is not preheated at all; possibly not until it gets out of the storage zone into the shaft. Naturally this has the same effect as reducing of kiln height. Kilns that already are short are actually shorter because the storage zone is not fully active for preheating of stone.

Second: While the kiln is a chimney, with this air coming down it is the same as a leaky chimney, and leaky chimneys are poor draft producers. If the storage zone would be hot, draft would be stronger and kiln capacity for burning fuel and for producing of lime would be greater.

Ordinary storage zones act like funnels, and as in the case of funnels, the stone feeds into the shaft most rapidly through the middle. Along the sides stone flow is much slower and so the stone hotter. The gases tend to go up where temperature is greatest, so they flow along the line on which stone feeds slowest into the kiln instead of the line along which it feeds fastest. This means neither stone is properly preheated nor gases properly cooled, and both kiln capacity and efficiency are seriously impaired.

Trimming

Another serious fault of the old fashioned kiln is that arrangement is never such that it can be trimmed properly; and proper trimming of lime when drawing is just about as important as anything. It is not only that the lime must be removed from the walls if long lining life is desired, but the hottest lime from over the eyes must be removed in preference to cooler lime in the center; and if not, kiln operation will be poor indeed, and most of the heat will go up along the hottest section and least along the coolest, where the most heat is needed. The drawn lime will contain much overburned stuff and much underburned with a great deal of core.

Operating in this way the cooler must also be kept tightly sealed as if any more air gets into the kiln center, which already is too cool, everything will be worse and the kiln will become thoroughly rocky.

With the cooler sealed fuel consumption is increased about 25 per cent and capacity correspondingly reduced, because most of the sensible heat of the lime is wasted, and this heat, if used to preheat the air, would be two or three times as valuable to the kiln as an equal amount of heat in the coal.

(To Be Concluded)

Changes Name

Crystal Lime Co., Orofino, Ida., has been organized to succeed and take over all the assets of the **Sewell Lime Co.** L. R. Loomis is secretary-treasurer. According to a local newspaper the original Sewell Lime Co. was capitalized at $500,000 and the founders held over half of this amount. The Crystal Lime Co. is capitalized at $75,000, with par value of shares at $100. The original organization held a one-third interest in the $25,000 in stock of the Crystal Lime Co. which is now outstanding, and the rest is being held in the treasury for sale. All obligations of the old company are being assumed by the new corporation and will be paid off as fast as possible, Mr. Loomis is quoted as having said.

The directors are Dr. W. F. Robertson, C. O. Portfors, J. H. Miller, Dr. H. D. Britan and L. R. Loomis Its officers are Dr. W. F. Robertson, president; C. O. Portfors, vice-president.

Buys Another Plant

Standard Lime and Stone Co., Baltimore, Md., has purchased the plant of the Potomac Lime and Stone Co., Eagle, W. Va.

Another Lime Putty Plant

Warner Co., Philadelphia, Penn., has authorized the construction of another Brooks-Taylor lime putty plant (see ROCK PRODUCTS, February 1936, pp. 28-29 for a description of the one at Wilmington, Del.) at its Berks St. yard in Philadelphia.

This plant will in general be a duplicate of the Wilmington plant. There will be a few minor detail changes, made in accordance with the practical experience developed at Wilmington.

The important change will be that the Philadelphia plant will have three seasoning tanks instead of the two that Wilmington has. Since one tank must always be held in reserve for seasoning and draining, this will give the Philadelphia plant twice the output.

The Wilmington plant is supported on open steel legs with open construction, under the tanks. This has proved unsatisfactory because of the severity of the winter just past. Accordingly, in Philadelphia, a reinforced-concrete building will be constructed. The ground level will be completely open for passage of trucks in any direction. The second floor level will be totally enclosed. The concrete floor will have suitable openings for discharging the putty from the batch measuring box into the trucks.

The steel work of the new plant will be furnished by the Birmingham, Ala., plant of the Chicago Bridge & Iron Works.

Cement Laboratory Inspection

THE Cement Reference Laboratory, a joint project of the National Bureau of Standards and the American Society for Testing Materials and sponsored by Committee C-1 on Cement of that Society, is now preparing for a fifth inspection tour among cement testing laboratories. Those laboratories which desire to avail themselves of this inspection service should address their requests therefor to the Cement Reference Laboratory at the National Bureau of Standards. Applications for inspections should be filed promptly since the itineraries for the inspectors will be prepared at an early date. The proposed tour will, in general, provide only one opportunity for the inspection of any laboratory during the next year or two.

New Quarry Equipment

Universal Atlas Cement Co., Hudson, N. Y., plant was scheduled to resume production early in March. During the winter shutdown electric shovels were installed in the quarry to replace outmoded steam shovels.

Buy Out Partner

Angeles Gravel and Supply Co., Port Angeles, Wash., announces that Richard and Fred Owens have purchased the interests of E. E. Nichols in the company. J. H. Scanlon will remain sales manager.

Resumes Production

Lehigh Portland Cement Co., Metaline Falls, Wash., plant was scheduled to begin production March 1. W. G. Perrow, district manager, was quoted in a local news dispatch as stating that for 15 days the plant will manufacture high early strength cement, which will be followed by standard portland cement production until that storage is filled, which will require about two months. A change then will be made to the manufacture of Grand Coulee cement, operations on which, it is expected, will continue for a year. The Metaline plant has storage capacity for 250,000 bbl., half of which will be devoted to Grand Coulee cement.

Improvements Made

Trinity Portland Cement Co., Dallas, Tex., has completed improvements costing $200,000 at its Fort Worth, Tex., plant, during the past year.

Changes Owners

Louis M. Reidenbach, building contractor, Napa, Calif., has purchased the Errington quarry from R. E. Errington, and will increase its stone crushing facilities.

New Corporation

Louisiana Stone and Lime Corp., Winnfield, La., has taken over the quarry and plant of **Palmer, Woolf and Gray,** following a sheriff's sale, in order to clear up some defects in the title to the property.

Transfer of title of all the land, approximately 2000 acres, together with all movable property of whatever nature and interests in agreements with other corporations and companies, was made from Palmer, Woolf & Gray to the Louisiana Stone and Lime Corp., for $350,000, the last and final bid, which amount is the purchase price paid by Palmer, Woolf & Gray to the Southern Mineral Co. on October 24, 1935.

A program of expansion contemplated by the Louisiana Stone & Lime Corp. includes the installation of lime kilns at the local plant. The kilns will be transferred from the plant of the Louisiana Lime Products Co. at Easton, La., which belongs to the same interests. To the plant at Easton will be transferred two of the rock crushing machines that were formerly used in the old plant at Winnfield before the present permanent concrete plant was installed and completed recently.

J. W. Taulman, Jr., Shreveport, is director of operations at both plants, while A. W. Stubbeman is superintendent of the Winnfield plant.

The crushed stone from these plants is sold to the Louisiana Highway Commission for aggregate in the construction of paved roads in the state, while another large consumer of the rock is the Solvay Process Co. at Baton Rouge in their alkali plant there.

To Move Plant

Granite Materials Co., Los Angeles, Calif., was voted by the city council a permit to move its operation, and erect a new plant on Tujunga Ave., over the veto of the mayor.

Fairmount Quarries, Inc.

Fairmount Quarries, Inc., Danville, Ill., has been organized as a subsidiary of the Material Service Corp., Chicago, Ill., to operate quarries formerly owned by the United States Steel Corp. and operated by the Casparis Stone Co. Henry Crown, president of the Material Service Corp., is president and William Hewitt, Danville, is vice-president and general manager. Mr. Hewitt was formerly with the Brownell Improvement Co., Chicago.

The new company plans to build a track to the quarries and will ship stone by rail over the Wabash and C. & E. I. railroads. The new owners expect to not only sell crushed stone for road building but also for railroad ballast.

New machinery, including crushers and loading cranes, will be installed as soon as possible, but the company has sufficient crushed stone on hand to last for several months, it is said.

New Development

New Hampshire Diatomite Co., Portsmouth, N. H., which took over the property formerly owned by the American Agricultural and Chemical Co., is about to begin operations. Much new machinery has already been installed and the company is awaiting the arrival of a classifier before manufacturing will begin.

Dredging Application

Maunie Sand and Gravel Co., Maunie, Ill., has made application to the United States Engineer Office at Louisville, Ky., for permission to dredge sand and gravel from the Wabash river between Mink Island and Mackey's Ferry.

New Regional Office

National Gypsum Co., Buffalo, N. Y., has opened a regional sales office for seven southeastern states at Atlanta, Ga. William H. Pulley, recently at Greensboro, N. C., will be in charge.

Dredging Permit Issued

West Virginia Sand and Gravel Co., Charleston, W. Va., has been granted a permit by the U. S. War Department to dredge sand and gravel in the Elk river near Charleston.

Enlarging Plant

Western Sand and Gravel Co., Spring Valley, Ill., is building a new washing plant to have approximately four times the capacity of the old one.

Importance of Feed Regulation: Its Effect on Processing Rock Products

By Harlowe Hardinge*

THE AVERAGE OPERATOR looks upon a feeder as an item of little importance. It has only been within the last three or four years that proper feeding has been brought forcibly to the attention of many operators, simply because they have had to watch their costs and grade of product, as never before. In analyzing the operation, some have discovered that the feeder, instead of being of minor importance, has an effect upon the process and apparatus used, to a far greater degree than its own cost would indicate. They have discovered that many of the evils attributed to other parts of the process can be traced right back to irregularities of the feeder, and these irregularities occurred even though the operator was very careful to see that he got what he thought was a regular and uniform feed.

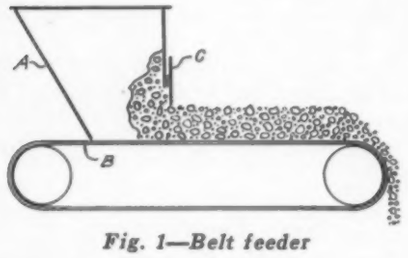


Fig. 1—Belt feeder

For example, if the feeder happened to be feeding a pulverizing mill, the blame was often placed upon the mill for delivering a product that varied in fineness and physical characteristics due to some factor which could be explained as an idiosyncrasy of the pulverizer itself, or then again, if feeding a kiln the product was over burned or under burned, and not only was constant kiln regulation necessary to prevent this difficulty, but the product was never uniform and the fuel consumption was high. Here again the blame was placed upon the kiln or the material itself for varying in characteristics when actual analysis showed that the weight of the material being fed to the kiln was constantly changing, even though the volume did not. The feeder, being a volumetric feeder, delivered a uniform volume, but for some reason the weight constantly changed.

Still again, where two or more materials were blended together, either in a batch or continuous mixer, it was impossible to be assured of a uniform product, containing the proper proportions, even though the feeders were carefully controlled. The same is true in feeding reagents, only here, the principal difficulty was over-correction and waste of the reagent.

The problem then arises as to the best way to correct this condition. It was obvious that the standard types of feeders used for feeding the material volumetrically, even though accurately controlled, could not give a uniform feed by weight. It then becomes necessary to feed by weight rather than by volume. The solution seems a simple one, but it is not so easy. There are not many ways to feed continuously by weight, without going to elaborate and costly equipment, but there is a solution.

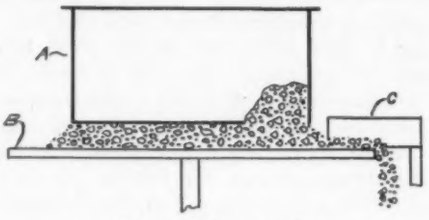


Fig. 2—Disc feeder

It is well, first to discuss what causes the variations in feed in the first place, and describe the general types of feeders in common use, some of which are the only types of feeders that ever can be used for the work at hand, while others have inherent defects and are in the wrong place.

Fig. 3—Roll feeder

Aside from the feeder itself, which may be inherently inaccurate because of the wrong type for the job, the principal factors causing variation in the feed are: material size, variation in specific gravity of the material, bin segregation, moisture, bulking, aëration and bin hang-ups.

Factors Causing Variation in Feed Rate

Where relatively coarse material is being fed from a bin, conditions are quite different than when fines flow from the same opening, owing to the resistance of the particle size against the walls and moving parts of the feeder; for, if we first have fine material and then coase material being fed from the feeder volumetrically, there will be a variation in the friction against the moving parts at some points and the feed will not be uniform. Some materials vary in specific gravity and they are composed of more than two main elements of different weights, and in this case, even if the particles were uniform in size, there would be a variation in the feed rate.

Bin segregation, when feeding materials of various sizes is probably the greatest single cause of trouble. Bin segregation usually occurs with materials whose maximum size is in excess of about ¼ in., and of course, the larger the maximum size piece becomes, the greater is the bin segregation. Attempts have been made to baffle the inside of the bin and prevent segregation, but for one reason or another, baffles do not seem to help much, as the material flows in channels and causes segregation in any event. Bin segregation first causes a quantity of coarse mixed with fines to flow, then practically all fines with a little coarse, and finally all coarse with a little fines. In each of these three cases the weight per cubic foot varies considerably, usually anywhere from 20% to 30%. The variation is far greater than ordinarily is realized, but can be checked readily by any operator using a cubic foot or any other standard volumetric measure, and when the feed changes in characteristics, take a sample and weigh it, compare it with the next sample when the feed size has changed. When we are trying to deliver a product from the process at a uniform rate, the feeder feeding volumetrically will not furnish the process the uniform feed desired, even though it is supplying the feed in a uniform volume.

Moisture plays an important part in regulating the feed rate. At times some materials contain an appreciable amount of moisture. It is impossible to remove the moisture unless pre-drying takes place ahead of the process or principal operation at hand. Moisture usually changes the physical characteristics of the material to such an extent that the material may bridge or become compact and lumpy, depending upon the size and character of material in the bin. This then causes a variation in the feed again. While there might be only 1% or 2% variation in the moisture, it can cause the packing or bulking effect inside the bin, and in turn cause a variation in weight per cubic foot of more than 10% from this cause alone. It follows that if the feeder could feed by weight rather than volume, it would not correct the 1 or 2% variation due to the weight of the moisture itself, but it would

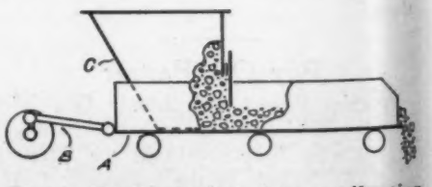


Fig. 4—Reciprocating plate or vibrating feeder

*Vice-president and general manager, Hardinge Co., Inc., York, Penn.

correct the 10% or more variation in weight per cubic foot, due to bulking, packing, etc.

Bulking often occurs when discharging fine dry materials, while bin segregation does not. Fine materials have a tendency to aërate when they are dropped into a bin, and then when allowed to remain in the bin for a period of time, become compact and in many cases so compact that they assume the characteristics of a solid mass, and this mass must be jarred loose, the result being that when all fine material is discharged from a bin, unless precautions are taken to keep the material active, it will soon bulk and bridge over. All the loose material will be discharged from the feed hopper and the feeder will run empty, even though the bin is full, except for the hollow place at the bottom, surrounding the feed hopper. When the material is jarred loose, it drops into the feed hopper with considerable force and becomes loose once more; in fact, so loose that it is again aërated and its weight per cubic foot decreases materially. Most powdered materials in the aërated state will be anywhere from 20% to 50% lighter than when in the unaërated state.

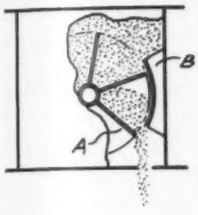


Fig. 5 — Rotary pocket or star feeder

With the ordinary volumetric feeder, the material discharged from the feeder will also vary anywhere from 10% to 50% in weight, with consequent variations all along the line. This condition can usually be corrected by various means to keep the mass in the bin active, such as bin rappers, scrapers, compressed-air expanders, and the like; but with all these methods there still is a considerable variation in the weight per cubic foot of fine materials, as they discharge from the bin. This variation is far greater than would at first be supposed and can only be realized by making an actual check over a period of time.

Volumetric Feeders

Various types of volumetric feeders will be reviewed here to bring out their advantages and limitations, particularly in feeding certain types of materials.

Fig. 1 illustrates the common belt type feeder. The feed from the bin enters the hopper *A* and is drawn from the hopper by the moving endless belt *B*. The rate of feed may be controlled by the gate *C* or the speed of the belt. In either case, the feed is controlled volumetrically as it passes through a definite opening at a definite velocity. Feeders of this type are very common for materials ranging from run of mine size on down to sizes of around 20-mesh or so. For very fine feeds there will be a tendency for the fine material to flood out of the feeder.

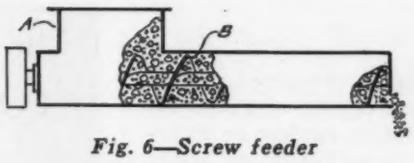


Fig. 6—Screw feeder

Likewise, if the material is extremely wet and sticky, the gate opening is small and the material is liable to lodge in the hopper bottom, as it converges at the feeder outlet.

Fig. 2 illustrates the standard disc type of feeder, which is also well known and used fully as much as the belt type of feeder. The disc feeder is not as accurate as the belt type of feeder, but is better suited to feeding certain materials. The feed hopper *A* allows the feed to cone out on the disc *B*, from which the material is scraped by the stationary scraper *C*. The disc usually is rotated at low speeds. Variation in the feed rate is attained by raising or lowering the distance of the hopper from the disc or the position of the scraper. Variation of the speed of the disc will also change the rate of feed. With changes in characteristics of the material either as to fineness or moisture, the angle of the cone or flow of material from the hopper to the disc will vary. The scraper will remove the material at a different rate, when these conditions vary. The advantage of the disc feeder is that it is simple and easy to regulate and will feed wetter material than any other type of feeder, as the hopper bottom is vertical and there is a larger total opening between the hopper and the disc than is the case with the belt type feeder. This feeder is not adapted to feeding very fine feed for the same reason as the belt feeder.

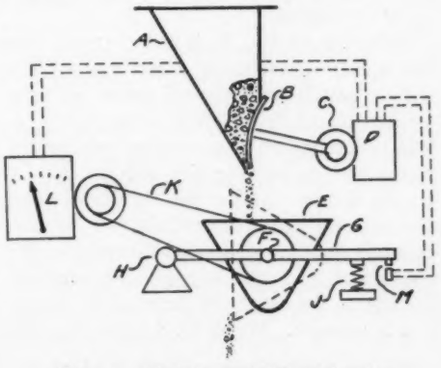


Fig. 7—Batch weighing feeder

The roll type feeder, as shown in Fig. 3, is more or less of a compromise between the belt type and the disc type feeder. It is very popular in feeding relatively wet materials of medium size, or quite fine materials if damp enough to preclude the possibility of aëration and flooding. This feeder has the same defects as the others when it comes to feeding fine dry materials that tend to flood.

Another popular type of feeder is that shown in Fig. 4, known as the reciprocating feeder, and its modification, the vibrating feeder. This feeder in principle consists of a reciprocating plate *A*, which moves back and forth by the link and crank mechanism *B*, close to the bottom of the hopper *C*. As the plate moves forward, it carries the material also forward to the end of the stroke while fresh material drops from the hopper between the space left by the material moving forward and the back of the hopper itself. When the plate moves back it slides underneath the material and the back of the hopper prevents the material from going backward. As the plate again moves forward, the material is also moved forward and discharges over the front edge of the plate. A modified form of this feeder is that design using an electric vibrator in place of the reciprocating crank and lever. Instead of long, slow strokes, the electrical vibrator produces short, rapid oscillations. The reciprocating feeder is simple, but not accurate. It is dependent upon the frictional resistance of the material against the bottom of the plate, and any variation in friction will automatically vary the amount of feed being delivered, in addition to the variation in weight per cubic foot of the material itself.

The feeders described so far are principally used for feeding relatively coarse or fine damp material, but are impractical for fine dry material that tends to flood or bulk.

Fig. 5 illustrates the rotating pocket or star type of feeder, which is used for delivering very fine material from the bin. It consists of a drum *A*, with pockets, rotating in a hopper where a portion of the sides *B* are brought in close to the drum. When the drum rotates and a pocket is in the upward position, it fills with fine material and is carried on around and drops out at the bottom. Flooding past the feeder is prevented by the close clearance at the sides. The capacity is regulated by the speed of the drum and the depth of the pockets.

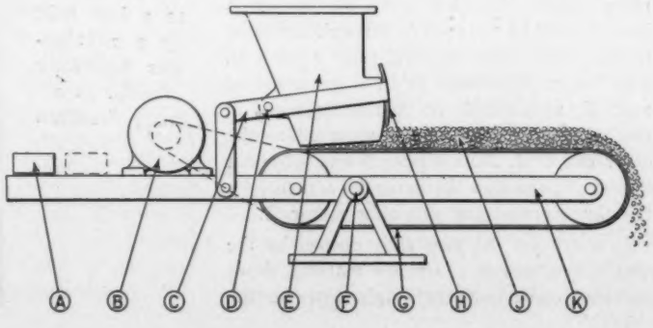
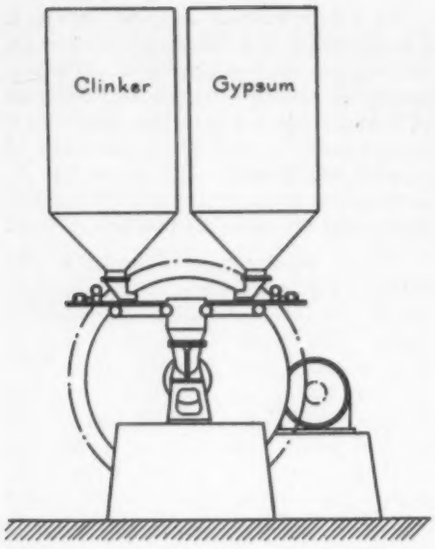
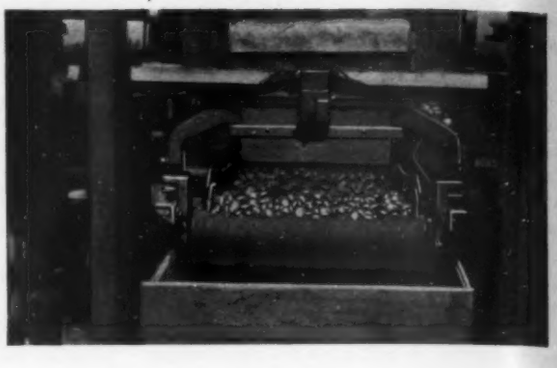


Fig. 8—Constant weight feeder — continuous weighing type





Left: Feeding gypsum and clinker with constant weight feeders to finishing mill in cement plant Right: Constant weight feeder delivering and weighing crushed stone from a storage bin

Fig. 6 illustrates a screw feeder. This type can be used for both coarse and very fine materials. Unless the screw is made very long, fine feeds can flood right around the screw and out the discharge end, just like water, unless the screw is always kept filled with the feed. Referring to the diagram, Fig. 6, the screw feeder consists of a hopper *A*, at one end of a standard screw conveyor *B*. This type of feeder is practical in some cases, although not as universally used as other types mentioned above, as it is not particularly accurate and can not operate with as damp feeds as some of the other types described. It has the advantage of being able to feed both coarse and fine materials and is dustless.

It will be noted that in none of the feeders already described are there any means for regulating the feed by weight; all are volumetric feeders. Some of them control the volume accurately and others are dependent upon other physical conditions to deliver a more or less uniform rate of feed, but always by volume.

Weighing Feeders

There are quite a number of ways that feed can be delivered from a bin by weight more or less successfully, to overcome the inherent defects of the volumetric feeder, as described above. Fig. 7 is a schematic drawing illustrating the principle of operation of that type of weighing feeder, which is basically a batch weighing method and has been used in varying forms for a good many years. The feed from the hopper A is controlled by the gate *B*, through actuating mechanism *C*, and electrical relay control *D*. The hopper *E*, pivoted at *F*, is supported by rods G, which rods in turn are pivoted at one end at *H*, and spring mounted at the other end at *J*. The hopper is rotated about its axis *F*, through the drive *K*, actuated by the time control and dumping motor *L*.

In operation the gate *B* is opened by the control mechanism *C* and the material flows into the hopper until the weight depresses the spring and makes a contact at *M*, at which time the relay *D* actuates the mechanism *C* and the gate closes. Then after a predetermined time, as controlled by the time mechanism *L*, the hopper is dumped and returned to its initial position, ready for a new charge. The time mechanism *L* then allows the gate relay *D* to open the gate and the cycle is repeated. Thus we have a method of weighing the feed automatically at predetermined rates. This method is essentially a batch weighing method, in that the operation is intermittent and controlled by a time actuating mechanism.

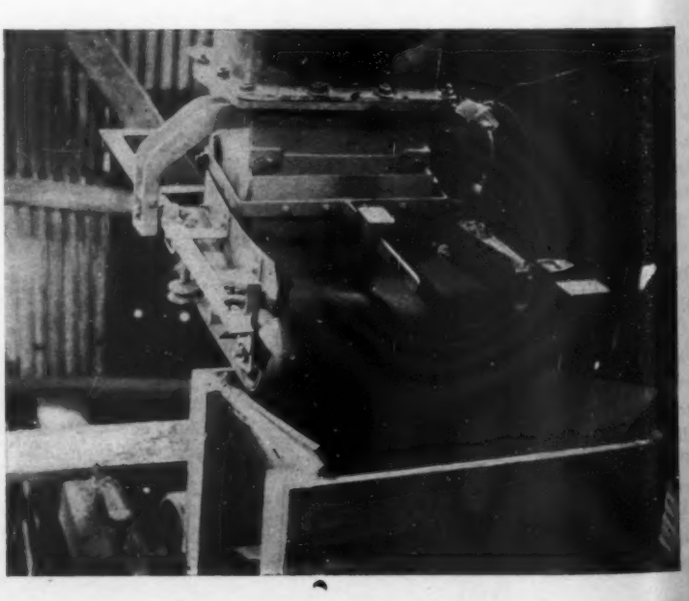
Another method of feeding at a constant weight has been developed, which is much simpler than this arrangement, and continuous in operation.

Referring to Fig. 8, it will be seen that this feeder is essentially a belt feeder. The endless belt is on a pivoted frame with the pivot point at *F*, underneath the hopper *E*. The belt is driven at a constant rate by the motor and speed reduction unit at *B*, also on the frame. As the feed is drawn from the hopper it is counterbalanced by the counterweight *A* at the opposite end of the frame, and the frame remains in equilibrium so long as the weight of the material on the belt is constant. When the weight per cubic foot changes, the equilibrium will be upset. If we assume that the weight on the belt increases, the frame will tend to tilt down and rotate about the pivot *F*, but in tilting down, the gate *H* at the feed hopper is also partially closed through the link mechanism *C* and *D*, thus reducing the volume to correspond with the increased weight per cubic foot, and the feeder is again brought in equilibrium with the weight of material going out on the belt just the same (but volume decreased) as it was before the weight per cubic foot changed, and we have the feed delivered at a constant weight, continuously and uniformly, irrespective of momentary or spasmodic changes in the weight per cubic foot at the bin gate.

By use of a revolution counter, an accurate record of weight over a period of time can be obtained, but of more importance still, with this feeder we have feed delivered from the bin at a known and constant weight. The evils attendant with a variation in weights by the volumetric feeders are automatically overcome, with the consequent increase in overall plant efficiency.

Feeder Applications

In the cement, ceramic and allied industries, one of the principal use of feeders



Feeding and weighing ore to a ball mill by a continuous weighing feeder in a dusty location

is regulating the rate of feed to grinding mills. Take for example, the feeding of raw mix in a cement plant to a ball mill, or feeding simultaneously, clinker and gypsum, to the finishing mill. We have in both cases the mill acting as a unit and its rate of discharge does not directly affect the balance of the process. It would then appear that feeding by volume would be as good as feeding by weight. It happens that there is a considerable difference in the effect on the mill itself.

In the case of feeding raw mix, an attempt is always made to proportion ahead of the mill in accurate quantities. If this is done volumetrically, it is impossible to obtain a uniform mix and is one of the causes for variation in analysis. At one time the limestone would be fed at a higher rate than the shale or clay, as the case may be. As a result, the product from the mill must be analyzed continually to see that the mix does not vary beyond certain limits. It has been generally assumed in the past that this variation is due to the variation in the material itself. It is true that the material does vary in its analysis, but it is also true that in volumetric feeding, the mix varies in weight. If we can eliminate one variable, we automatically reduce the chance of error and improve the final product considerably.

In the case of feeding gypsum and clinker, a careful control of the quantity of gypsum fed has a great influence on the strength of the finished cement, as all cement manufacturers know. A careful control of both the rate of feed of the clinker and the gypsum will make it much easier to meet specifications and all other conditions being the same, a better cement will be made, with less checking of the product.

As for feeding kilns, dryers, mixers, blenders and reagents, the same advantages hold true. In fact, in the majority of cases, feeding by weight will have marked advantages over volumetric feeding. It is only in exceptional cases that volumetric feeding is to be preferred.

There is another important factor in feeding by weight which has not generally been recognized, and that is the increase of mill capacity and efficiency. When feeding by volume, the mill capacity must be set so that an overload will not occur when the volumetric feeder happens to be feeding the heaviest weight per cubic foot. If this were not the case, the operator would be continually changing the feed from one-half hour to the next. As a consequence, the mill capacity must be lowered purposely to avoid a periodic overload. If the mill is fed by weight, rather than by volume, the operation is much more uniform and the mill can be fed very close to its maximum capacity, without fear of overload. It is not difficult to see that if you have a variation in weight, when feeding by volume, of from 20% to 30%, over a period of one-half hour or an hour, as is usually the case, that the mill can very easily be increased 10% in capacity without overloading. This automatically reduces the cost of grinding by at least that amount, since the mill is not only able to grind at a greater capacity for about the same power and labor cost, but the wear on the parts is reduced and the upkeep costs are also lowered.

If it required a complicated mechanism or major change in the layout to feed by weight, rather than by volume, the advantage would not show up so well as it does in practice. It is now possible to obtain constant weight feeders at very nearly the same capital outlay as volumetric feeders, with all the advantages of the volumetric feeder.

As stated at the beginning of this article, it has only been within the last few years since simple and practical weighing feeders have been developed, that the real value of constant weight feeding has manifested itself. Unfortunately, many plants have been so restricted in their purchases that they could not make any alterations at all, but now that times are improving, it seems that the operator could very well study the possibilities of controlling his operation by weight, rather than the older method of volume.

New Use for Cement

A NEW TYPE of cement coated shingle is about to be announced by leading manufacturers of roofing material. These shingles, which will be known generically as cementop shingles, are the result of a special processing method developed by Bakelite Building Products Co., Inc., New York City. By the new process conventional asphalt shingles are given an extra surface coating of special formula hydraulic cement in which mineral oxide pigments are incorporated.

Batched Cement and Aggregates

Marquette Cement Manufacturing Co., Chicago, Ill., is marketing a new product from its Cape Girardeau, Mo., plant, according to local report. It is known as "Cem-Crete" and promises to become a popular product. It is advertised mainly for patching work and is a sacked mixture of cement and sand, or cement and crushed stone, fine and coarse aggregate. This is along the lines suggested in the editorial in the December issue of ROCK PRODUCTS, although the editor did not know of it at the time the editorial was published.

Sold at Auction

Meramec Portland Cement and Material Co., St. Louis, Mo., assets netted $1671.20 in supplementary auctions on January 3, by the liquidating trustee. The sales included several items taken over by mortgage holders, the bid-in figures not being included in the net total given.

Bankruptcy schedules of the company showed assets at $488,883 and liabilities at $457,713. Federal Judge Davis adjudicated the company bankrupt, after officers had been unable to effect reorganization.

To Build New Plant

Portsmouth Mixed Concrete, Inc., Portsmouth, Ohio, has purchased a strip of ground on the north side of lower Fifth street from the Standard Oil Co. as a site for a new plant. Dimensions of the lot are 178 ft. by 107 ft.

The firm at present is located in the old building of the Portsmouth Brewing & Ice Co. on Second street.

Samuel Frowine is president of the company, and Henry Bayerl is secretary-treasurer and general manager.

New Quarry

Weaver Construction Co. has opened a new quarry west of Lowell, Ia., to furnish material for a highway construction contract.

WPA Builds Quarry Road

Columbia Quarry Co., St. Louis, Mo., through recommendations of the Columbia, Ill., Commercial Club, will have the St. Clair county road that provides access to its Columbia quarry, No. 1, improved as a WPA project.

For Rip Rap

Tobin Quarries, Inc., has leased a hill property southeast of Corwell Park, Neb., to open a quarry for revetment work on the Missouri river. The rock will be trucked from quarry to river.

New Company

Wayne County Limestone Co., Flora, Ill., was recently incorporated by Jerd V. Smith, C. W. McCullough and J. D. Knodell, of Flora. The new company will produce and market crushed stone, agricultural limestone and sand and gravel.

Fired to Provide WPA Jobs

Tower Grove Quarry and Construction Co., St. Louis, Mo., according to local newspapers, offers an outstanding example of WPA methods. This company's quarry has been leased to WPA (one of several local quarries so leased) and the company's score of more experienced employes, some of them with the company 20 years, have been fired to make room for 170 relief "workers." The superintendent was retained. He said the only way for the regular employes to get back on pay roll was "to go on relief"—a fine example of the federal government's assistance to industry!

State Quarry

North Carolina will operate the Woodlawn limestone quarry, near Spruce, N. C., which it recently purchased, at 100,000 tons for 1936. Preparations are being made to put the quarry into operation.

Stone quarried will be used both for road stone and for agricultural liming purposes throughout this section of North Carolina.

Cement Products

Developments in Concrete

Annual Convention of American Concrete Institute Traces Progress

FIRST SESSIONS of the three-day, 32nd annual convention of the American Concrete Institute were held in Chicago on February 25 with presentation of five papers and the proposed "Building Regulations for Reinforced Concrete" at afternoon and evening meetings. C. H. Scholer of Kansas State College, Manhattan, Kan., in his paper on "Durability of Concrete," described laboratory tests and used slides to show the factors influencing durability. Important factors, as shown in the chart based on freezing and thawing tests, were the manner of water saturation, the duration of cold, the kind of melting and the number of chills. Of less importance were the degree of filling of pores, the end temperature of cooling, the velocity of cooling and the manner of melting. Mr. Scholer stressed the importance of quality in the ingredients of concrete, especially cement, as influencing the durability of concrete, and concluded with the remark that "durability tells the character of concrete." E. R. Dawley, of Kansas State College, in his paper, "The Effect of Alternate Heating and Cooling of Mortar," reported tests of concrete specimens which checked, cracked, increased in length and in weight and lost up to 65 per cent in strength in 40 to 50 cycles of heating and cooling, *without* freezing.

Repair of Concrete Structures

Co-authors of the papers on "Maintenance and Repair of Concrete Structures" were: R. B. Young, Hydro-Electric Power Commission of Ontario, Toronto; J. Lamprecht, engineer, Northern New York Utilities, Inc., Syracuse, N. Y.; L. F. Harza, Harza Engineering Co., Chicago, and H. G. Roby, Byllesby Engineering and Management Corp., Chicago; and F. W. Capp, Railway Bureau, Portland Cement Association, Chicago.

Deterioration of concrete was attributed by Mr. Young to poor design, poor quality or combinations of these two factors. Each of the speakers agreed that no method of repairing was suitable to all failures and that the repair should be made to correct the reason for failure after the cause of deterioration was determined. Poor design of joints was mentioned as one of the particular causes of failure. Mr. Roby, in his paper, said that comparatively little money is available for building new structures, and emphasis must be placed on repairing and maintaining those we have.

Mr. Lamprecht's talk centered on methods of repair as applied to dams. He emphasized the importance of making the new repair surface stick to the old and the necessity of adequate waterproofing of the upstream surface. Methods of repair were listed as the cement-sand plaster method, the "gravity place" method, the brush grout and pressure concrete processes. Numerous lantern slides were used to illustrate forms of deterioration and construction methods to repair the damage.

Cast-Stone Manufacture

"Modern Technique in Cast Stone Manufacture" was the subject of a paper read by C. G. Walker of the Portland Cement Association. He said that in the past the architectural features of cast stone had been emphasized and that the principles of ordinary concrete making, which apply, had been neglected. Charts were shown giving tabulations of stress values for cast stone averaging in excess of 9000 p.s.i. The methods of operation from beginning to end in a modern plant were shown. Mr. Walker said that vibrated cast stone was of higher quality and that leaner mixes and tighter molds were desirable.

An analysis of savings possible in building costs was made in Prof. F. E. Richart's paper on "A Study of the Economics of High Strength Concrete in Building Construction." Charts served to show savings possible in floor slabs, T-beams, columns and footings. A possible saving of 25 per cent for a 2000-lb. concrete and 55 per cent for a 6000-lb. concrete were shown in columns. In addition to savings in money by using high strength concrete, other advantages mentioned were the greater durability which will result, greater workability and resistance to abrasion. These advantages are offset by an increased shrinkage, a higher deflection and a smaller factor of safety. The evening session was concluded by a lengthy discussion of the new proposed regulations for reinforced concrete submitted by Institute Committee 501.

Election of Officers

F. R. McMillan, research director of the Portland Cement Association, was elected president and J. C. Pearson and John J. Earley were chosen vice-presidents. E. Viens, R. L. Bertin, C. T. Morris, Ben Moreell, F. E. Richart and F. V. Reagel were elected directors of the first, second, third, fourth, fifth and sixth districts, respectively. R. B. Young was elected director-at-large and secretary-treasurer Harvey Whipple was reëlected.

Aggregates—Workability

Geological features and methods in the handling of aggregates were discussed in a paper on "Handling Materials at Grand Coulee Dam," by Gordon Dodge, Jeffrey Manufacturing Co., Columbus, Ohio. The paper was followed by the reading of papers on "Concrete by Pump and Pipeline" by Charles F. Ball of the Chain Belt Co., Milwaukee, Wis., and "Underwater Placement of Concrete—San Francisco-Oakland Bay Bridge" by S. M. Hands of the California Division of Highways.

A new viewpoint to the study of workability was brought out in a paper on "Factors of the Workability of Concrete" by W. H. Herschel and E. A. Pisapia of the National Bureau of Standards, Washington, D. C. In this progress report, Mr. Herschel pointed out that workability cannot be expressed by a single numerical value or wholly determined by one test method. New harshness, shear resistance, segregation and adhesion tests were described in detail.

Concrete Products

An entire morning session was turned over to papers and discussion of concrete products. C. A. Menzel of the Portland Cement Association, in his paper on "High Pressure Steam Curing in Concrete Products Manufacture," presented a review of the results of studies previously reported to the Institute. Tests of regulation units in curing cylinders were described in some detail. The most important conclusion derived from these tests, was that high pressure steam curing at 350 deg. (120-lb. gauge pressure) at 8 hrs. was the ideal. Any lower temperature would necessitate a

longer curing period, while no advantages were noted for higher temperatures. Curing at 350 deg. F. will enable the delivering of block 20 hrs. after molding.

R. E. Copeland, in his paper on "Rain Resistance of Walls of Masonry Units," described results of a field study conducted by the Portland Cement Association to determine moisture and leakage resistance of masonry walls. Airplane propellers were used to create a wind velocity of 25 m.p.h. and water was introduced in chambers, under 16-ft. head so that rain and wind could be projected to a section of masonry wall at gale-like velocity. Normal wind velocity averages 11 m.p.h. Plane and oscillated block of different mixes, some coated and others unpainted, were used in the tests.

Copper electrodes were inserted in the wall and connected in such a manner that a drop in resistance (showing the entry of water) could be noted on a resistance meter, and the time required for entrance of water could be recorded. Unpainted, unoscillated block showed low resistance to entry of water, while painted units showed nearly perfect resistance. Conclusions drawn were as follows: The proper use of portland cement paint makes masonry walls practically impervious to water; the degree of imperviousness depends upon good workmanship; one coat of paint will greatly increase the resistance to water; two coats give much better results than one; applications of paint by brushing give better results than by spraying; water will penetrate an unpainted masonry face in 5 minutes or less and will reach the back face in one hour or less, and finally, the stucco wall shows no signs of water after 219 hours of testing.

Benjamin Wilk read the report of Committee 710 on "What High Early Strength Means to the Concrete Products Manufacturer." Tests were based on 70 lb. of high early strength cement versus 94 lb. of regular portland cement, in order to compare advantages and disadvantages of the two at an identical price level. Charts were used to show the results of tests made at Lehigh University, the Lehigh Portland Cement Co. laboratory and at the Standard Building Products Co., Detroit, Mich. Results showed higher strengths in favor of high early strength cements at all ages considered and for all aggregates.

Ready-Mix

R. L. Bertin's paper on "The Economics of Ready Mix Versus Job Mix Concrete" was offered as a general exposition of the application or use of both ready mixed and job mixed concrete from the standpoint of the contractor to serve as a guide to assist him in the selection of the most advantageous method of supplying his job with concrete of desired quality. Costs range from $5.45 to $8.25 per cu. yd. for ready mixed concrete in various parts of the country, according to an article appearing in *Engineering News Record*. The range in cost of job mixed concrete for the great variety of job conditions, labor rates, material costs, etc., for different parts of the country, far exceeds the figures given for ready mixed concrete, according to Mr. Bertin.

Sound Absorption

Studies of a wide range of concretes by F. R. Watson of the University of Illinois were the subject of his paper on "Sound Absorbing Value of Portland Cement Concretes." The two tests described were used to determine the absorption coefficients of different concretes when sound waves of a definite time interval fall upon them. The absorption coefficient, or percentage of absorption, was found to be 62 per cent for haydite, 21 per cent for limestone and from 51 to 55 per cent for cinder concrete. Painting was found to reduce these values approximately 10 per cent.

A highly technical illustrated discussion of the strength of "Isteg Steel for Concrete Reinforcement" was offered by D. B. Steinman of New York, N. Y. Possible economies in design of concrete structures, because of the higher yield strength of Isteg steel, in comparison to ordinary reinforcing were pointed out.

The report of Committee 609 on "Recommendations for Placing Concrete by Means of Vibration" concluded the final session. The paper dealt with applications of various types of vibration and numerous precautions in the use of vibrators under many conditions.

Masonry Associations Hold Successful Conventions in Detroit

THE ANNUAL CONVENTIONS of the National Concrete Masonry Association and the National Cinder Concrete Products Association, held jointly in Detroit on January 21, 22 and 23, were the most successful in the history of the two associations. The registration of close to 200 tripled that of last year, and included products men from 23 states and Canada.

The arrangements were unique in that only the first day was spent in session and that the remainder of the time was turned over to bus inspection trips throughout the city and suburbs. Outstanding jobs in masonry were reviewed, including many of the newer, finer homes built in Detroit in 1935. The itinerary included stops at several of the larger plants, where demonstrations were held in the manufacture of units on new 1936 machines installed by the manufacturers.

Home Construction

Four papers were presented by well-known authorities in the meetings of the first day. The first of these papers, on "Concrete Masonry in Modern Home Construction," by Alden Dow, Midland, Mich., dealt with the trends in public opinion as affecting home building and scientific home construction. As Mr. Dow expressed it, the concrete masony home should be built in practical sized dimensioned units instead of being measured in terms of feet and inches. Of particular interest was the block developed by Mr. Dow, with the exposed unit 12 in. sq., which is laid so that vertical joints are all in the same line.

Albert E. Bill, well-known Detroit builder, spoke on "Why I Build Small Homes of Concrete Masonry." In this paper, Mr. Bill told the advantage inherent in such a home: low-cost, easy-laying, easy-heating, attractiveness, durability, etc. He said that the trend today is toward the Early American or Colonial home and that the wise operator should follow trends instead of trying to make new ones.

Trends

The first paper in the afternoon session was that of Arthur K. Hyde, Detroit architect, on "An Architects' Idea of the Future of Concrete Masonry." In this paper, the history of building was traced up to the more or less experimental "International Style," from which Mr. Hyde said he believed a new architecture will develop. Speed of construction, the comparative temporary life of structures due to obsolescence, the necessity for fireproof buildings, mass production of building materials, and the demand for utmost economies were listed as salient factors in the establishment of trends in home-building in the near future.

Mr. Hyde was very optimistic as to the future of concrete products and said that there was a decided change in public approval in favor of these products. He stated his opinion that larger units will be made and that slabs will be light and thin.

E. D. Straight's paper on "My experience with Concrete Ashlar" included detailed descriptions of the use of ashlar in theatres in Detroit. W. C. Kaiser, manager of the cement products bureau of the Portland Cement Association presented a talk on "Concrete Houses—Yesterday, Today and Tomorrow," in which he brought out the fact that we are now on the upward swing of the 15 year building cycle. His talk was illustrated with many slides of charts and masonry homes built in 1935.

Officers

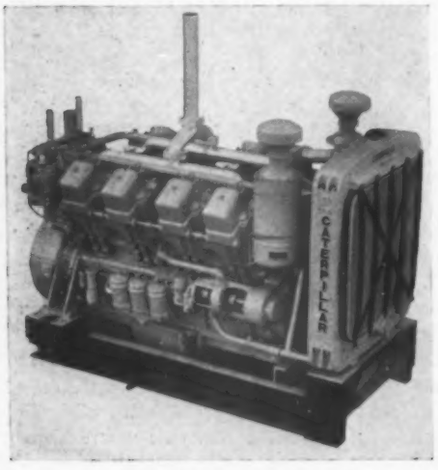
Officers elected for the National Concrete Masonry Association were D. F. Servey, Kansas City, Mo., president; G. H. Krier, Brooklyn, N. Y., vice-president; Austin Crabbs, Davenport, Ia., secretary-treasurer; and D. R. Collins, Chicago, assistant secretary-treasurer.

R. N. McCandless, Detroit, president; M. W. Ferguson, Roanoke, Va., and George Goelitzer, Kansas City, Mo., vice-presidents, and H. H. Longenecker, Philadelphia, Pa., secretary-treasurer, were elected by the National Cinder Concrete Products Association.

New Machinery and Equipment

V-8 Diesel Engine

CATERPILLAR TRACTOR CO., Peoria, Ill., announces a new V-type 8-cylinder Diesel engine, 160 hp.—the D17000. It is a true Diesel engine, 4-stroke-cycle, valve-in-head, water-cooled, and features solid injection of fuel into pre-combustion chambers. Bore and stroke are 5¾ in. x 8 in., and the governed speed is 850 r.p.m. Equipped as illustrated it weighs 11,500 lb.



V-8 Diesel engine

A 28-hp., 2-cylinder gasoline starting engine is mounted at the rear of the engine directly over the flywheel housing. It is of 4-cycle, horizontal opposed piston design having a bore and stroke of 3¼ in. x 4 in., and a governed speed of 3000 r.p.m. Warm jacket water from this engine quickens starting by circulating around the Diesel cylinders.

Other new models are the D6600, 3-cylinder, 60 hp.; and the D4400, 4-cylinder, 44 hp.

Rotary Air Compressor

ALLIS-CHALMERS MANUFACTURING CO., Milwaukee, Wis., announces a new line of two-stage sliding vane rotary air compressors for pressures up to 100-lb. G. The design is unique in that both stages as well as the inter-cooler, are contained in a single casting. This new type of compressor is designated the "Ro-Twin."

Compact twin compressor

Compared with the usual design of two-stage rotary having two separate cylinders, the manufacturer claims it offers the advantages of greatly reduced length and floor space, still less weight, only one stuffing box and one coupling, no external air piping between stages to keep tight and a simpler lubrication system. Having only two bearings, and one flexible coupling, alignment is said to be easily maintained. The air delivery is free from pulsations and the operation smooth, quiet and vibrationless, according to the manufacturer.

The design is made possible through the employment of the wear-eliminating "floating rings" which have been a feature of Allis-Chalmers sliding vane rotary compressors and vacuum pumps.

A complete line of "Ro-Twins" has been developed, from 20-hp., 1740 r.p.m., to 100-hp., 690 r.p.m., for actual air deliveries from 69 c.f.m. to 412 c.f.m. at 100-lb. G air pressure.

Arc welding unit on 1½-ton truck

Welder Driven by Truck

HERCULES STEEL PRODUCTS CO., Galion, Ohio, in conjunction with Lincoln Electric Co., Cleveland, Ohio, has developed an arc welding unit to install on any 1½-ton truck. The power take-off, which makes a truck a power plant as well as a means of transportation, is made in various models to operate as a direct drive or from the side. The unit is adaptable to all makes and models of trucks. It does not affect the road speed or power of the truck, since it simply replaces a portion of the truck's drive shaft.

Power supplied by any leading make of 1½-ton truck is sufficient to drive either a 200-ampere or a 300-ampere welding generator. The power take-off can be controlled from the driver's seat by a single lever. While welding, the speed of the truck motor is controlled by a fly-ball type mechanical governor.

Made of chrome-nickel alloy steel, this power take-off weighs 100 lb. fully installed. All bearings are anti-friction ball and roller type. The unit is guaranteed to transmit 120 brake hp. at 2800 r.p.m., 220 ft. lb. torque.

Centrifugal Fire Pumps

AN IMPROVED LINE of Underwriter-approved centrifugal fire pumps, designated as the group LG, single-stage volute type, is being placed on the market by Worthington Pump and Machinery Corp., Harrison, N. J. This pump is built for direct connection with electric motors, Diesel, gas or gasoline engines, or steam turbines, and for reliability in prompt starting and operation. Each pump is fully inspected and improved for fire pump service by the National Board of Fire Underwriters and the Factory Mutual Fire Insurance Companies, and is equipped with all fittings and accessories required in each Underwriter specification.

Truck Windshield Wiper

REX-HIDE, INC., East Brady, Penn., makes a new soft, carbon-base rubber, windshield wiper blade with a hollow, perforated tube running its length. Ten flexible wiping ribs create alternate areas of pressure and suction with the stroke, drawing water into the hollow tube through the perforations. The self-cleaning operation prevents the same water from being smeared back and forth across the windshield. With its balloon construction, this new blade, it is claimed, will hug even a warped glass and wipe it clean. For extreme ice and snow, an ordinary pipe cleaner can be dipped in glycerine, then bent at one end and hung inside the hollow tube of the Rex-Hide blade. This will maintain a glycerine film on the windshield for several hours, remove sleet, and prevent ice from forming on the glass. All metal parts of the new Rex-Hide wiper blade are of stainless steel.

Electric Excavators

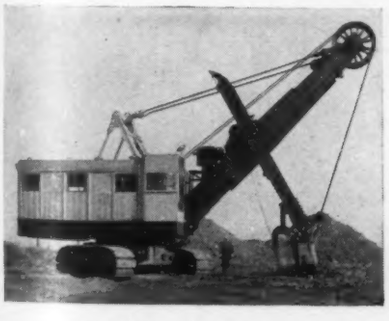
A NEW SERIES of Ward Leonard electric excavators, with capacities up to 4 cu. yd. is announced by the Harnischfeger Corp., Milwaukee, Wis. Complete one-man control for all operations in travel and steering, as well as digging, is combined with faster speeds, less weight and greater electrical horsepower per pound, according to claims made for the new machines.

In these machines, P & H designers say they have taken advantage of two basic developments: New alloy steels and arc welded construction to cut down inertia losses and speed up operations. Large members, such as boom and dipper sticks are of high tensile steel for lightness with greater strength. Cast frames have been discarded for lighter all-welded construction with structural steels.

In contrast to conventional design, the new P & H Ward Leonards use worm gear in the crowd mechanism for the first time in any power shovel. According to P & H engineer this design eliminates brake wear and results in a faster, smoother crowding action which makes it possible to shake the dipper without strain.

Steering is accomplished through locking and clutching jaws on the corduroys which permit the blocking of one side or the other for making sharp or gradual turns without the help of ground men. Jaws are operated by hydraulic cylinders electrically controlled from the operator's seat.

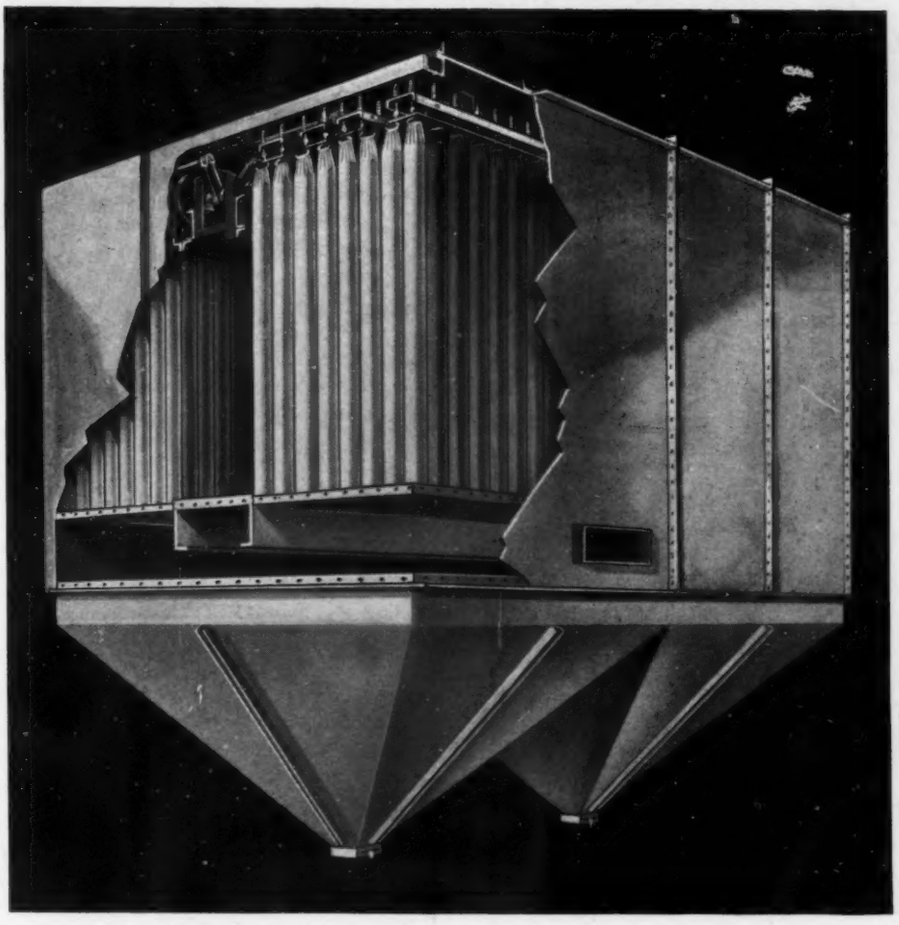
Brakes and clutches are also hydraulically controlled, eliminating hand levers, pedals, reach rods, bell cranks, etc. Splined shafting of high grade, heat-treated alloy steel is used freely throughout. Shovels and draglines are offered in capacities from 2 to 4 cu. yd.



Speedy electric shovel

Dust Collector

AMERICAN FOUNDRY EQUIPMENT CO., Mishawaka, Ind., has announced the "American Dustube" dust collector, claimed to be of the simplest practical design. The tubes are special woven fabric, which can be changed to suit the specific installation. These tubes are hung from racks in the ceiling; self-acting dust seals hold the tubes to the bottom, without clamps, bands or intricate devices. Spring suspension of the dust tubes maintains the proper tension of the cloth. Each tube is independent, and if it is damaged it can be unhooked, rolled up and placed in the inlet seal at the bottom, sealing the opening temporarily without interfering with the operation of the collector as a whole. It is claimed that new tubes can be inserted in 5 minutes' time. This type of collector, it is said, can be applied to old or worn-out collectors now installed. Maintenance and operating costs are claimed to be low because the large air chamber and open design of the tube inlets permit lower air suction within the casing.

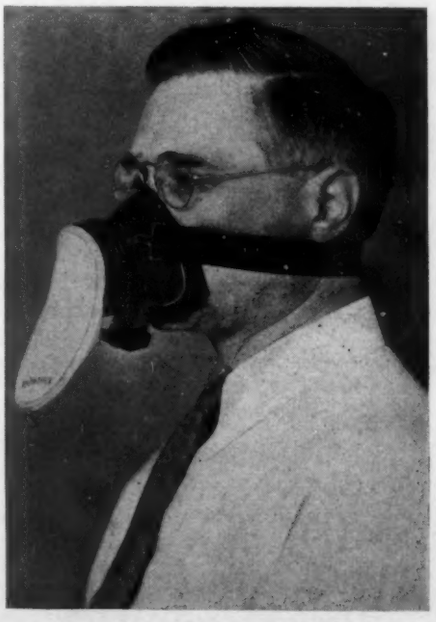


Dust collector of simple design

Respirator

A NEW TYPE respirator with approved high efficiency, having passed the U. S. Bureau of Mines tests for lead and Type A dusts, has recently been offered by Willson Products, Inc., Reading, Penn. It has a filter bag through which breathing very close to normal is assured. This because of very large filtering area of 40 sq. in. The face mask is made of rubber and is adjustable to any shape of face by bending a wire forming spring which constitutes a part of the lower mask edge.

The filter bag is assembled on the mask by means of a screw ring inside of which is the intake valve assembly, including moisture baffle, serrations to prevent air lock, and a flexible intake diaphragm. Air is drawn in through the filter bag at the front and exhausted through the valve assembly below the face mask. Filter disc replacement problem is solved by the use of this cleanable bag type filter, which in most cases lasts as long as the respirator itself. The complete respirator weighs 5¼ cunces.



Respirator for Type A dusts

Ohio Association Meets

OHIO SAND AND GRAVEL ASSOCIATION held its annual meeting in Columbus, Ohio, February 5, and elected the following directors: Stephen Stepanian, Columbus; H. D. Stillion, Zanesville; D. S. Foland, Dayton; M. T. Epling, Gallipolis; Chas. K. Oberle, Cincinnati; W. L. Talbott, Chillicothe; Ray Van Camp, Cincinnati; F. C. Fuller, Portsmouth; William Edward Hole, Greenville; L. D. Vincent, Parkersburg, W. Va.; H. C. Slater, Columbus; J. J. Gorman, Zanesville; J. H. Evans, Columbus; Hal G. Knight, Akron; E. E. Clementz, Massillon; Earl Zimmerman, Cincinnati; W. O. Brewer, Chillicothe; A. E. Frosch, East Liverpool; W. P. Watson, Hamilton, and Zain Armitage, Lebanon.

From these officers were elected as follows: President, Wm. Edward Hole, American Aggregates Corp., Greenville; vice-president, J. J. Gorman, Zanesville Gravel Co, Dresden; J. H. Evans, Sturm & Dillard Co, Columbus, treasurer, and Claude L. Clark, Columbus, executive secretary, were re-elected.

The forenoon meeting was devoted to the officers' reports, and a general discussion of the standardizing of sizes of aggregates as proposed by the U. S. bureau of standards. This discussion was led by Robert Litehiser, chief engineer of tests, Ohio state highway department.

The luncheon meeting was addressed by John J. Jaster, Jr., director of highways; L. A. Boulay, acting director of the public works administration, and J. O. Kinnear, engineer in the works progress administration.

The afternoon session was devoted to a general discussion of the federal social security act and the amended sales tax act.

V. P. Ahearn, secretary, and Stanton Walker, director of engineering and research, National Sand and Gravel Association, Washington, D. C., were present, and took active part in various discussions.

Wisconsin State Code

HEARINGS were recently held in Madison, Wis., to find out how the various code authorities created by the Wisconsin Recovery Act of 1935 were working out.

Otto W. Lutz, Milwaukee, chairman of the code authority for the crushed stone, sand and gravel industries, testified that labor had been given better pay, reasonable hours and additional security through the code.

Before establishment of the code "labor worked from daylight to dark," he said, and now members of the industry have increased income sufficiently to pay state income taxes after a lapse of several years.

Moreover, he testified, sanctity of contract did not exist prior to promulgation of the code and contractors frequently interfered with persons having exclusive contracts by intruding upon these contracts.

Rigid enforcement of the code would eliminate conditions such as those that grew out of a bribery case in Milwaukee county where some high officials went to jail for accepting bribes from contractors, state code officials were told by N. K. Wilson, executive secretary of the code authority, who testified that he was familiar with the Milwaukee case and that the practice of making side deals with public officials or inspectors during that demoralized period of the industry was fairly prevalent.

"Without mentioning names," Fred M. Wylie, special counsel for the Wisconsin Recovery Administration asked, "do you know that in some cases by collusion with public officials there was a cutting on the quality?"

"Yes. That is so," Mr. Wilson replied.

"Do you think the machinery under the code would be effective to eliminate these practices?" Mr. Wylie asked.

"With coöperation on the part of everybody concerned, with the sincerity and honesty of the people of the code authority, backed by rigid enforcement, I think we can make this code a success," Mr. Wilson said.

Some employers defeated the minimum wage provisions of the code by increasing the charge for "board and keep," Mr. Wilson testified. He said that where the wages were high, the charge for board and keep was high. "By increasing the charge for board it is possible to defeat the minimum wage provisions of the code."

He claimed that in Green, Lafayette, and Iowa counties this practice had been in effect. The system of board charges, he testified, could be used as a form of "chiseling on wages," and produced an unfair competitive condition for the producer trying to maintain a fair rate of pay.

Because they liked "to run their own business," 22 firms registered opposition to the state code for the crushed stone, sand and gravel industry at a continued hearing two weeks later.

"I see no protection in the code for the dealer," F. B. Dunnebacke, Kenosha, stated in registering opposition to the code.

Mrs. G. E. Nutt, Plymouth, of the Waupaca Sand and Gravel Co., declared that while the code might be a good thing for Milwaukee it doesn't work for her concern. She objected to the provisions in the code limiting the number of hours of labor.

Edward Kraemer, Plain, who operates a portable rock-crushing plant in Sauk City, opposed the code. "I claim I can run my business better than anyone can run it for me," he said.

Walter Patitz, Milwaukee, representing the Waukesha Lime and Stone Co., registered in opposition to the code "because we like to run our own business."

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On January 18 a Milwaukee circuit court judge, in the first case brought under the state code of the crushed stone, sand and gravel industries, signed an order restraining Frank Clark, sand and gravel producer in the town of Wauwatosa, from violating the code. An affidavit by Fred M. Wylie, attorney for the code authority, alleged Clark had been bidding for sand and gravel without reference to costs. The order will remain in effect until trial of the suit brought by Wylie, charging violation of the code.

Big Ballast Order

Utah Sand and Gravel Products Co., Salt Lake City, Utah, has been awarded a contract by the Western Pacific Railroad Co. for the construction and operation of a large gravel ballast plant near the railroad line on the California-Nevada boundaries, Eric Ryberg, president of the corporation, announced recently.

The plant will be constructed at a cost of $75,000 and will have a production capacity of 3000 tons of crushed, screened, graded ballast gravel per day, Mr. Ryberg said.

It is expected the plant will be in operation by April 15 and will furnish this year in excess of 300,000 tons of gravel. The plant will operate during a three or four-year improvement program to be carried on by the railroad.

Plan Municipal Plant

Mt. Vernon, N. Y., contemplates opening a quarry and building a $40,000 crushed stone plant for municipal works.

Contracts Let—Prices Bid

Ogden, Utah: Contracts for 50,000 bbl. of cement for use in construction of the Ogden River reclamation project was announced recently by Secretary Ickes in Washington. One contract for 30,000 bbl. was awarded to Union Portland Cement Co., Denver, Colo., at about $2.05 per bbl. The other 20,000 bbl. were purchased from Portland Cement Co. of Utah, Salt Lake City, at $1.94 per bbl.

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Ironton, Ohio: City let contracts to Standard Slag Co. for concrete sand delivered at $1.75 per ton; crushed slag delivered at $1.40; to Union Concrete Pipe Co., Huntington, W. Va., for 155 ft. of 48 in. reinforced culvert pipe, $5 per ft; 230 ft. 36 in. reinforced culvert pipe, $3.25 per ft.; 425 ft. 30 in. reinforced concrete pipe and 332 ft. 27 in. reinforced concrete pipe at $2.15 per ft.

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Mansfield, Ohio: City purchased 50 tons of concrete sand from Purdy Construction Co. at $1.14 per ton; other bids were uniformly $1.20; 50 tons of mason's sand from Purdy Construction Co. at $1.19; other bids $1.20; 50 tons of gravel at $1.35; 50 tons of granulated slag, grade A, from Builders' Supply Co., at $2.00; 50 tons of granulated slag, grade B, at $1.50; 250 tons of crushed limestone in two grades at $1.40 and $1.50, respectively, from the Lomax Coal Co. (dealer).

THE INDUSTRY

New Incorporations

Little Creek Sand and Gravel Corp., Norfolk, Va.; maximum capital, $10,000. Nathan Block is president.

Romm Sand and Gravel Corp., New York, N. Y.; capital, $30,000. Filed by Albany Service Co., 315 Broadway.

Mahoney Sand and Stone Co., Inc., New York, N. Y.; 200 shares, no par. Filed by John E. Mahoney, 270 Broadway.

Banner Sand and Hauling Co., St. Louis, Mo. Incorporators are Fred W. Goessling and Wilbur B. Jones, 506 Olive St.

Crystal Fluorspar Co., Marion, Ky. Incorporators are W. W. Runyon and Tom Turner.

Maryland Mica Co., Spruce Pine, N. C.; authorized capital $25,000, subscribed, $3000. Incorporators are Galen Sparks, Ed. N. Vance and David T. Vance.

American Lime and Silica Products Co., Dover, Del.; buy and sell products; $200,000. Incorporators are Arley B. Magee, Jr., Ellender P. Jones and Ann G. Richards.

Harris Lime Co., Lincoln, R. I.; limestone quarry and products; capital, 500 shares common, no par. Incorporators are William T. Cullion, Burton K. Harris and Percy J. Wilson.

Everding Corp., New York, N. Y.; to deal in sand and gravel; 200 shares, no par. Incorporators are Irving B. Cohen, 257 92nd St., Brooklyn; Irwin A. Eris and Frank S. Du Beshter, 153 Pierrepoint St., Brooklyn.

Southland Materials Co., Greenville, Miss.; to deal in sand, gravel, brick, cement and building materials; authorized capital, 300 shares, par value $100 each; subscribed, 10 shares. Incorporators are S. A. Gano, S. O. Neyman and W. L. Crouch.

Eureka Mica Manufacturing Co., Waynesville, N. C.; to mine, manufacture and sell minerals; authorized stock, 1100 shares; subscribed $1000. Incorporators are W. W. Davis, J. W. Cole, H. G. Stone and Mrs. R. H. Blackwell.

Karlock-Minerals, Inc., Asheville, N. C.; to mine and manufacture minerals, ores, etc., particularly vermiculite; 500 shares authorized; subscribed, $400. Incorporators are J. P. Karager of Chicago and H. Edwin Pollock of Asheville and Pittsburgh, and Thomas L. Johnson and T. A. Uzzell, Jr., of Asheville.

Personals

Geo. A. Russell, formerly assistant treasurer and assistant accountant of Canada Cement Co., has been appointed comptroller of the company.

R. L. Overton, Nashville, has been appointed Tennessee representative for the Alpha Portland Cement Co.

L. M. Winford, manager of Gilmer and Winford Sand and Gravel Co., Minden, La., was married January 1 to **Miss Portia Feathertson** of Murfreesboro, Ark.

George Trombold, formerly superintendent of the Ash Grove Lime and Portland Cement Co. plant at Chanute, Kan., is now head of Chemical Products, Inc., Tulsa, Okla.

Claud Hurt of Tescott, Kan., has become engineer for the Quartzite Stone Co., Lincoln, Kan., replacing **John Holmquist**, who has accepted a position as district manager for the Donald Sellman Features, Corsicana, Texas.

Miss Cora Stanton Jahncke, 21, was queen of New Orleans' historic Mardi Gras, February 25. She is the daughter of Ernest Lee Jahncke, former Assistant Secretary of the Navy and executive of Jahncke Service, Inc., New Orleans, La.

J. R. Newberry of Lisbon Falls, Maine, has taken over management of the United States Gypsum Co. plant at Greenville, Miss., succeeding **Jerre R. Massey**, who has been transferred to the sales department, with headquarters at Atlanta, Ga.

Robert B. Henderson, president of Pacific Portland Cement Co., San Francisco, Calif., is chairman of a committee drawing up a program for formation of a Pacific Coast Economic Conference. The effort to unify the policy of Coast industry on business questions is sponsored by regional business groups and the National Association of Manufacturers.

Obituaries

H. E. Newbury, an official of the Pennsylvania-Dixie Cement Co., died at his home in Atlanta, Ga., January 26, aged 51.

John A. Kling, 69, a director and former president of Kelley Island Lime and Transport Co., Cleveland, Ohio, died January 31. President of the Cleveland Builders' Supply Co. since its formation in 1908, Mr. Kling was a national figure in the building supply industry. He was active in civic affairs, and, during the war, served as a dollar-a-year man. Death came as the result of shooting by a crazed chauffeur, who, upon being discharged, fatally wounded a fellow employe and Mr. Kling and then committed suicide.

John A. Kling

George R. King, 77, Hot Springs, Ark., died of a heart attack February 22. He was a retired president of the United States Gypsum Co.

Karl Leo Nagle, chief electrician, Castalia Portland Cement Co., Castalia, Ohio, died February 22 from a stroke of apoplexy. He had served with the company for 15 years.

Henry F. Meyer, 69, for many years a foreman for the Janesville Sand and Gravel Co., Janesville, Wis., died February 8. He had been in failing health for many years and critically ill for nine weeks.

Alexander Horlick, 91, president of Horlick Lime and Stone Co., Racine, Wis., for many years and more recently a retired resident of Milwaukee, Wis., died January 25 at the home of his son in Oconomowoc, Wis., where he had been visiting.

Henry Hatzfeld, 79, an early-day quarry operator of Carthage, Mo., died January 18 at the home of a daughter in Webb City, Mo. He had been in a critical condition since December 21, when he was struck by a motor car. He was one of the founders of the Carthage Marble and White Limestone Co., about 50 years ago, and had also served as superintendent of the company.

Gordon Buchanan, East Orange, N. J., newly elected chairman of the Manufacturers' Division of the National Crushed Stone Association, died March 4. A well-known engineer, formerly associated with his late father in the C. G. Buchanan Co., he was at the time of his death with the Pennsylvania Crusher Co., Philadelphia, Penn. Mr. Buchanan was for many years active in association work.

Ralph Edward Nicholson, 45, president, National Cement Co., Birmingham, Ala., died February 21 after a long illness. A native of Missouri, Mr. Nicholson early became active in the zinc smelting industry in Kansas and Oklahoma. He enlisted in service during the World War. In 1920 he moved to Birmingham to become vice-president and general manager of the cement company, later becoming president.

Dr. Jessie Drew Carpenter, treasurer of Allwood Lime Co., Manitowoc, Wis., died January 20. Her friend and partner in business, Miss Mary E. Squire, has written of her partly as follows: "Dr. Carpenter donated the first money to buy paper and stamps to make inquiries about lime deposits, preliminary to the formation of the Allwood Lime Co. in 1911, and had been actively engaged with that company ever since. Though not having the qualities for scientific research or writings, her appreciation and understanding, and especially her enjoyment of the published articles concerning the Allwood discoveries, were so sincere and happy that her loss to her partner of 43 years is irreparable. She was the eldest daughter of Wallace Carpenter, an old Montana ranchman. A beautiful woman, in every way, of unusual charm and unusual modesty and dignity, she was truly described by a young Italian worker, who introduced both of us to a friend in these words: 'Miss Squire, she mi Padroni; Dr. Carpenter, she mi Madre Amiga'; and that is just what she was—a 'mother-friend' to every man, woman and child at the Allwood plant. For 'the doctor' never was too busy to listen, or to heal, if possible, bodily, mental or heart sickness, and was trusted beyond measure—a full, a useful and a beautiful life."

Quarries

Duncan, Okla.: WPA has approved $6000 for a quarry near Duncan.

Hickory, N. C.: Work on a WPA quarry on Barger's branch, near the J. C. Plonk place, was recently started.

Lineville, Iowa: A rock quarry has been leased on the Kern Bright land and WPA labor is producing material for street paving.

Marysville, Kan.: A 10x30-in. jaw rock crusher was recently installed at the county quarry near Oketo.

Hornell, N. Y.: WPA recently allocated $72,600 to Steuben county at large for the operation of ten stone quarries.

McPherson, Kan.: The city recently purchased a crusher, which is operating to produce rock for WPA surfacing of park drives.

Unionville, Mo.: Limestone for street surfacing is being quarried and crushed in the Lone Star neighborhood.

Indianola, Iowa: The board of supervisors contemplates abandoning the Hammondsburg WPA quarry as the rock vein is thin.

Hanover, Kan.: The WPA crusher is being operated on the Bremen road for highway surfacing.

Clinton, Ark.: Van Buren county recently purchased a rock crusher for $2000, to be used on WPA projects.

Maryville, Mo.: Nodaway county has set up one of its two recently contracted crushers on a quarry just north of Arkoe.

Lenoir, N. C.: A quarry project south of town was recently approved by WPA. Streets and sidewalks will be paved.

Newkirk, Okla.: The city recently purchased a rock crusher from R. H. Baldwin of Ponca City, for use in a WPA quarry preparatory to construction of a city dam.

Kahoka, Mo.: The Clark County Improvement Association has leased quarries on the J. H. Maddox and the L. B. Wayland farms, both to be operated by CCC labor.

Oroville, Calif.: WPA has approved a $12,188 project setting up a county rock crushing plant at the serpentine quarry at Magalia.

Plattsburg, Mo.: The county court recently leased from Mrs. J. C. Atchison a rock quarry to produce material for road improvement in the Gower section.

Moran, Kan.: Work was recently begun at the Lusk rock quarry north of Moran to secure 2600 cu. yd. of rock for a WPA street project.

Union Star, Mo.: A crusher was recently installed at the quarry west of town and WPA funds are financing production of rock for the street surfacing project.

Orting, Wash.: Rock from a newly opened quarry on the Electron road is being hauled down to Sumner to rip-rap the Puyallup river.

Garnett, Kan.: The WPA rock crusher on the Parker-Greeley road broke down early in February and work was held up until repairs could be made.

Knoxville, Iowa: A crusher arrived early in February for use by the Soil Conservation Service and was set up on the Durham quarry.

Wheeling, W. Va.: Among four projects recently approved by WPA is one for a new quarry on Gashell's Ruh to produce limestone for road jobs.

Red Oak, Iowa: CCC workers are quarrying and crushing limestone for agricultural and conservation purposes from the leased site on the William Gammel farm.

Anadarko, Okla.: Caddo county WPA officials were recently seeking a suitable rock deposit for production of material for the municipal auditorium.

Mauston, Wis.: Juneau county has purchased a new portable rock crusher to produce road material and agricultural limestone. It is operating at the Zumstein pit.

Rock Port, Mo.: Atchison county recently bought a Universal rock crusher, including truck and 16-ft. elevator, for $1570, to be set up on the Sly farm, south of Rock Port.

Paris, Texas: A CCC quarry has been opened two miles from Roxton to supply crushed stone for improving roads in the Lake Crook state park.

Metz, Mo.: Metz township has purchased a rock crusher and WPA workers are operating a quarry on the Francis Payne property for road material.

Odell, Neb.: The city recently purchased a rock crusher and set it up on the Van Hook farm, on which WPA labor is operating a quarry for a street improvement project.

Holdenville, Okla.: Hughes county recently purchased a rock crusher and is producing material from local limestone ledges for road improvement under WPA.

McConnelsville, Ohio: A stone quarry has been opened on the Roy Mincks place in Center township to produce material for the Albright hill road.

The Colorado Fuel and Iron Co. lime quarry at Monarch, Colo., was recently closed because of adverse weather. Operation will be resumed the latter part of May, shipments in the meantime being made from stock.

Wakefield, Kan.: A stone crushing project was recently started by the county in Athelstane township to produce material for 3½ miles of road north from Industry to the Longford road.

Kansas City, Kan.: The board of county commissioners recently voted $25,000 in pick-and-shovel bonds to purchase tools for various WPA projects. A quarry is being opened near Stony Point school.

The Quartzite Stone Co., Lincoln, Kan., has purchased a portable stone crusher which it will lease to the state highway department for crushing shell limestone for Highway 18.

Trenton, Mo.: Rock is being quarried for the $25,000 WPA street graveling project, on the "Eli Briggs place" of Mrs. Ina Harrelson on Edinburg hill, which has been leased to the city for a year for $150.

Cambridge, Ohio: Three WPA stone quarries were opened recently in Millwood, Richland and Adams townships to produce material for WPA road work throughout Guernsey county.

Joe Richardson and **R. H. Baldwin** have purchased the stone quarrying plant of **Joe Wittmer**, Oklahoma City, Okla., and have set it up at a 10-ft. ledge of stone northeast of Ponca City.

Ottumwa, Iowa: The WPA quarry has been equipped with a 14x36-in. primary crusher, a secondary crusher, jack hammers, a 700-gal. pump, and a 100-hp. motor—all valued at $15,000—to be paid for on a production percentage basis.

Junction City, Kan.: Geary county has purchased a hammer-type Day limestone pulverizer of 100-tons-in-10-hours capacity. Stone is being quarried for a $28,000 sewerage disposal plant at Council Grove, and the city contemplates getting a crusher.

Fond du Lac, Wis.: The WPA quarries at Ripon and Hamilton are producing 100 tons of pulverized limestone a day. The price of $1.25 a ton, delivered at the farm, is being continued, and orders from farmers come steadily to this project.

Oneonta, N. Y.: Operation of a quarry on Swart Hollow road is the city's fifth WPA project. The city is providing $3839, while WPA furnishes $7616. The city got a 10-year lease on the quarry on the Harry J. Alger farm for $300.

Leavenworth, Kan.: The county has opened a new quarry on the Walter Denholm farm, near Moore's station, north of Tonganoxie. The quarry on the Kern place southwest of Leavenworth is not being operated now, as the new quarry provides a shorter haul to the Leavenworth-Tonganoxie road being surfaced.

Creston, Iowa: Two limestone quarries in Union county are furnishing crushed rock for road surfacing and for agricultural purposes. One of these is a WPA quarry, southwest of Thayer, in Jones township. The other quarry, privately operated, is on the Bullock farm, west of Oak Hill church, in Pleasant township.

Sand and Gravel

Olean, N. Y.: WPA has allotted $6540 for operation of a city-owned gravel pit on West State Street.

H. W. Bussey, Sycamore, Ga., recently started to make daily shipments from his farm of sand suitable for uses in paving work.

West Chestnut Sand and Gravel Co., Arkansas City, Kan., has installed a new sand hopper at its digging site near the Arkansas river on Chestnut avenue.

Burbank, Calif.: The city's new WPA rock crushing plant is supplying gravel, crushed rock and sand for municipal projects. The plant cost $13,000.

Southeastern Gravel Co., Tallahassee, Fla. (Robert Blount, president), suffered loss of its office when the building in which it is located, the Bank of Tallahassee Building, was destroyed by fire February 21.

Tecumseh Gravel Co., Tecumseh, Mich., has had its term of corporation extended for 30 years from February 22. The officers of the firm are R. F. Harper, president; F. B. Wood, vice-president; S. L. Lowry, secretary; and W. F. Fisher, treasurer and general manager.

H. B. Zachry Co., Laredo, Texas, is constructing the first section of the Webb-Catarina highway. Gravel screens, a crusher, and other equipment were recently set up and a gravel roadway built from the Zachry gravel pits to Highway 2.

J. K. Davison & Bros., Pittsburgh, Penn., have been awarded a large sand and gravel contract by Schenley Distillery for a warehouse at Schenley on the Allegheny river. About 25,000 tons of sand and gravel will be delivered in barges to a point above Freeport.

Cement

Standard Portland Cement Co., Cleveland, Ohio, has moved from 925 Midland Building to 1501 Builders Exchange Building.

Cement Products

The California Concrete Products Co., San Carlos, Calif., recently resumed activity. J. J. Fennell, manager, announces that a large storm sewer contract from Redwood City will keep the plant busy for several months.

Concrete Products and Roofing Co., Birmingham, Ala., among current contracts, is furnishing the Ernest Henderson residence in Mayfair with black English concrete tile, the Louis Pizitz residence with variegated water seal tile, the residence for Mayor M. G. Marley of Ozark with green Mission tile, and the school at Town Creek with black French tile.

Manufacturers

Link-Belt Co., Chicago, Ill., has appointed Feenaughty Machinery Co., Portland, Ore., as its distributor in Pacific Northwest territory.

Link-Belt Co. has moved its St. Louis, Mo., office from 3638 Olive St. to 1018 Louderman Bldg., 317 N. 11th St.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Penn., celebrated its golden jubilee January 8.

Kensington Steel Co., Chicago, Ill., announces that Forrest E. Smith has been elected secretary.

Lincoln Electric Co., Cleveland, Ohio, announces removal of its Pittsburgh office to 926 Manchester Blvd.

Four Wheel Drive Auto Co., Clintonville, Wis., has appointed Melvin Giersbach as export representative at Shanghai, China.

Caterpillar Tractor Co., Peoria, Ill., reports sales for 1935 as $36,447,193, as compared with $23,769,320 in 1934, an increase of 53%.

Patterson Foundry & Machine Co. announces appointment of Kenneth S. Valentine as district manager at New York.

Harnischfeger Corp. has appointed Charles R. Surface as sales manager of the P&H electric motor sales division, with headquarters at the home office in Milwaukee, Wis.

The Newark Wire Cloth Co., Newark, N. J., has appointed Robert H. Brinton, 1640 Castle Court (P. O. Box 1970), Houston, Texas, as its Texas representative.

White Motor Co., Cleveland, Ohio, announces that orders in January this year increased 77% over January, 1935, and deliveries increased 64%.

Cutler-Hammer, Inc., Milwaukee, Wis., announces appointment of R. J. Eckstein as manager of the district office at 1405 East 6th St., Cleveland, Ohio.

Geo. P. Reintjes Co., Kansas City, Mo., announces appointment of Alex Girtanner as representative in the sale of furnace wall and arch construction.

Harnischfeger Corp., Milwaukee, Wis., announces appointment of R. L. Mead as manager of the Chicago office at 20 North Wacker Drive.

Waukesha Motor Co., Waukesha, Wis., announces appointment of James E. De Long as general manager. Mr. De Long is executive vice-president of the company and head of its executive board.

American Hoist & Derrick Co., St. Paul, Minn., announces the retirement of Howard S. Johnson, vice-president, as of January 1. His place on the board has been filled by Rolf E. Ljungkull, chief engineer.

Timken Roller Bearing Co., Canton, Ohio, at a meeting of its board, elected R. C. Brower director to fill the vacancy caused by the death of J. G. Obermier. Mr. Brower is secretary-treasurer of the company.

Johns-Manville Sales Corp. announces appointment of George Dandrow as manager of the New York district of the power products and industrial department, with offices at 22 East 40th St., New York City.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has appointed A. D. Brown manager of the Los Angeles district office, to replace the late Boyd Anderson. H. E. Weiss succeeds Mr. Brown as manager of the Buffalo office.

Contract Welders, Inc., and **Industrial Welding & Cutting Co.**, both of Cleveland, Ohio, were merged January 1, and will be consolidated in equipment and organization April 1 as Contract Welders, Inc., in large quarters at 2545 East 79th St.

Birdsboro Steel Foundry and Machine Co., New York City office, in January received an order for two 48x60 Type C jaw crushers from Climax Molybdenum Co., Climax, Colo. Shipment of an 18x36 Type B crusher is also being made to San Antonio Gold Mines, Ltd., Bissett, Man., Canada.

Timken Roller Bearing Co., Canton, Ohio, has promoted S. C. Partridge to assistant general manager of the industrial division, with headquarters at Canton. S. C. Merrill has been promoted to Eastern district manager at Detroit, to fill the vacancy caused by Mr. Partridge's transfer. F. B. Yates replaces Mr. Merrill as manager of the New York district office.

Halafax Explosives Co., Los Angeles, Calif., recently made a single sale of 2,500,000 lb. to be used in projects including the Rosa work at Yakima, Wash.; Seminoe dam and power plant, Parco, Wyo.; Shoshone tunnels, Cody, Wyo.; Imperial dam, Southern California; All-American canal, Imperial Valley, Calif.; and Gene and Intake pumping plants, San Bernardino and Riverside, Calif.

General Electric Co. announces appointment of Neil Currie, Jr., to succeed Walter S. Goll, who has retired, as manager of its Fort Wayne (Ind.) Works. Mr. Currie was manager at the Philadelphia works before this transfer, and is succeeded there by R. V. Good. J. D. Wright and Karl H. Runkle have been appointed assistant managers of the industrial department.

General Electric Co., Schenectady, N. Y., received orders in 1935 amounting to $217,361,587, compared with $183,660,303 during 1934, an increase of 18%. Not one fatal accident from occupational cause was suffered by a G-E employe during 1935, it is announced. J. E. N. Hume, former assistant manager of the industrial department, has been promoted to manager, succeeding the late W. W. Miller.

Worthington Pump and Machinery Corp., Harrison, N. J., has been awarded a contract for six centrifugal pumping units of 12,000 hp. each—the largest pumping units ever built in this country—for the Metropolitan Water District, Los Angeles, Calif. Three 5000 hp. units for the Metropolitan Water District were also ordered from **Allis-Chalmers Manufacturing Co.**, Milwaukee, Wis., and six 8000 hp. units from the **Byron Jackson Co.**, Berkeley, Calif.

Foster Wheeler Corp., New York, N. Y., announces the election of Harry S. Brown as president, to succeed his brother, J. J. Brown, who resigned as president but continues actively as chairman of the board. David McCullough has been elected executive vice-president; and Walter F. Keenan, Jr., George B. Ferrier and J. J. Nelis have been elected vice-presidents. P. N. Wenz has been elected secretary. The company recently granted a license to Green Fuel Economizer Co., Inc., Beacon, N. Y., to manufacture an extended surface economizer under Bell patent 1,565,305, which is Foster Wheeler property. European rights to the Foster economizer are held by E. Green & Son, Ltd., Wakefield, England.

Trade Literature

Calcium Chloride Stabilized Roads. Literature containing many charts, tables, and useful information is available, on request, from COLUMBIA ALKALI CORP., Barberton, Ohio.

Crushers. Bulletin 112, 16 pages, describes Type TY reduction crushers, featuring diagrams to illustrate operation. TRAYLOR ENGINEERING & MFG. CO., Allentown, Penn.

Wire Rope. A new pocket-size catalog of 112 pages has spiral binding and adds a general information section as well as manufacturing views with a description of processes. MACWHYTE CO., Kenosha, Wis.

Elevating and Conveying. Section 106 of General Catalog 100 is a 288-page book on bulk material handling machinery, giving installation photographs, diagrams, specifications and descriptions. PALMER-BEE CO., Detroit, Mich

Electric Drills. A circular illustrates Thor UC class universal electric drills and nut drivers. Catalog 32 presents specifications on an entire line of electric tools. INDEPENDENT PNEUMATIC TOOL CO., Chicago, Ill.

Pumps. Centrifugal pumps for handling slurry, sludges, fine abrasives and gritty mixtures, designed with severe-service casing, impeller, stuffing box, bearings, etc., are taken up in Bulletin 156, 16 pages. MORRIS MACHINE WORKS, Baldwinsville, N. Y.

Higher Screening Efficiency

• • • • •

Better graded materials now possible with this LEVEL SCREEN

The necessity for closer sizing is a problem confronting many plants. With today's demand for better screening and with material specifications becoming more and more rigid, obsolete screening equipment can not be expected to meet these requirements.

The flat Symons Screen with its unusual action offers a standard of efficiency not found in any other type of screen. Its other features, too, recommend its use where better screening is desired.

- Placed level, it sizes more accurately and saves headroom.
- Weight of screen not carried on bearings.
- All vibrating parts counterbalanced.
- Longer life of cloth due to less grinding action of material.
- Feed is automatically distributed evenly over entire screen area.

Let us show you how this level screen will best fit into your operations.

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SCREENS - SYMONS - CRUSHERS

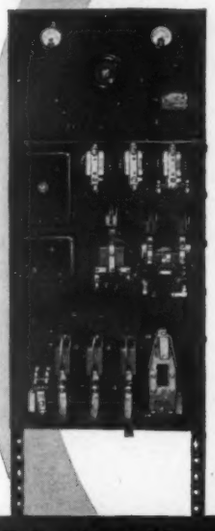
WHICH CONTROLLER
For Your Synchronous Motor?

G-E synchronous-motor controllers, such as those shown here, will provide 100-per-cent protection for your synchronous motors under all operating conditions. Contributing to this protection are two exclusive features which make these controllers outstanding in their field—each is provided with a squirrel-cage protective relay and a power-factor field-removal relay.

What Does This Mean to You?

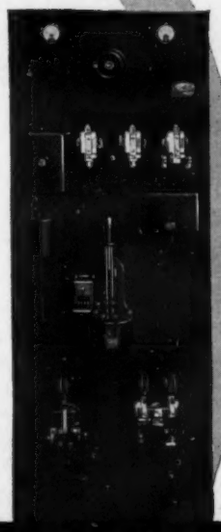
It means that the shutdowns and repair expense caused by burned-out squirrel-cage windings are eliminated by the protective relay. And it means that line disturbances caused by motors pulling "out of step" are minimized by the action of the power-factor field-removal relay.

Synchronous-motor controllers are only one example of General Electric's ability to supply reliable and efficient electric equipment for every application. An installation of the right G-E motors, control, and wire and cable is a money-saving combination. Write or call the nearest G-E sales office, or General Electric, Dept. 6N 201, Schenectady, N. Y.



Full-voltage Magnetic Controller

This device is the most commonly used and the least expensive of the complete line. It is particularly suitable for low-speed synchronous motors, but it can be used wherever the power system will not be unduly disturbed by the full-voltage inrush current of the motor. With it, you can automatically control the motor by a push-button station, pressure switch, float switch, or similar pilot-control device

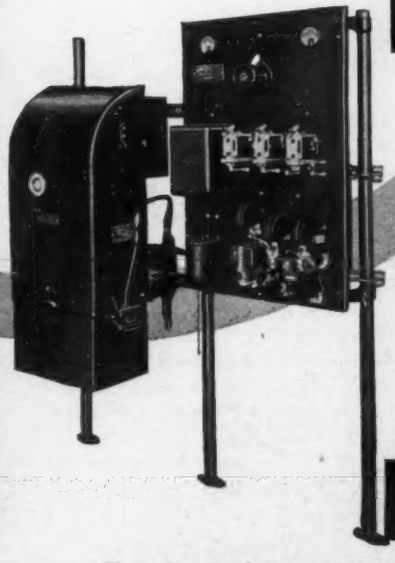


Full-voltage Semimagnetic Controller

Where remote control is not required and where operating conditions are such that an operator is in attendance, the full-voltage semimagnetic controller can be used to advantage. It will minimize line disturbances by automatically applying field after the proper motor speed has been reached. It offers the same sturdy construction and reliable operation provided by G-E magnetic-type controllers.

Reduced-voltage Magnetic Controller

The reduced-voltage magnetic controller is designed for use on systems where full-voltage starting is not permitted, or where reduced starting torque is required by the application. Like the full-voltage magnetic controller, it is operated by a push-button or pilot-control device. It employs an autotransformer, a starting contactor, and a running contactor. The controller first automatically applies reduced voltage and then, after a definite time delay, applies full voltage to the motor



Reduced-voltage Semimagnetic Controller

The reduced-voltage semimagnetic controller is especially suitable for general-purpose service where the power system requires reduced voltage. It can also be used to advantage for starting loads where it is desirable to apply reduced torque to minimize shocks and possible damage to driven machines. Starting of the motor is accomplished by pushing the handle forward. Transfer to full voltage is made by moving the handle to the "run" position

THE RIGHT MOTOR FOR EVERY JOB—THE RIGHT CONTROL FOR EVERY MOTOR

080-45

GENERAL ELECTRIC

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Agitators, Thickeners and Slurry Mixers
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Timken Roller Bearing Co.
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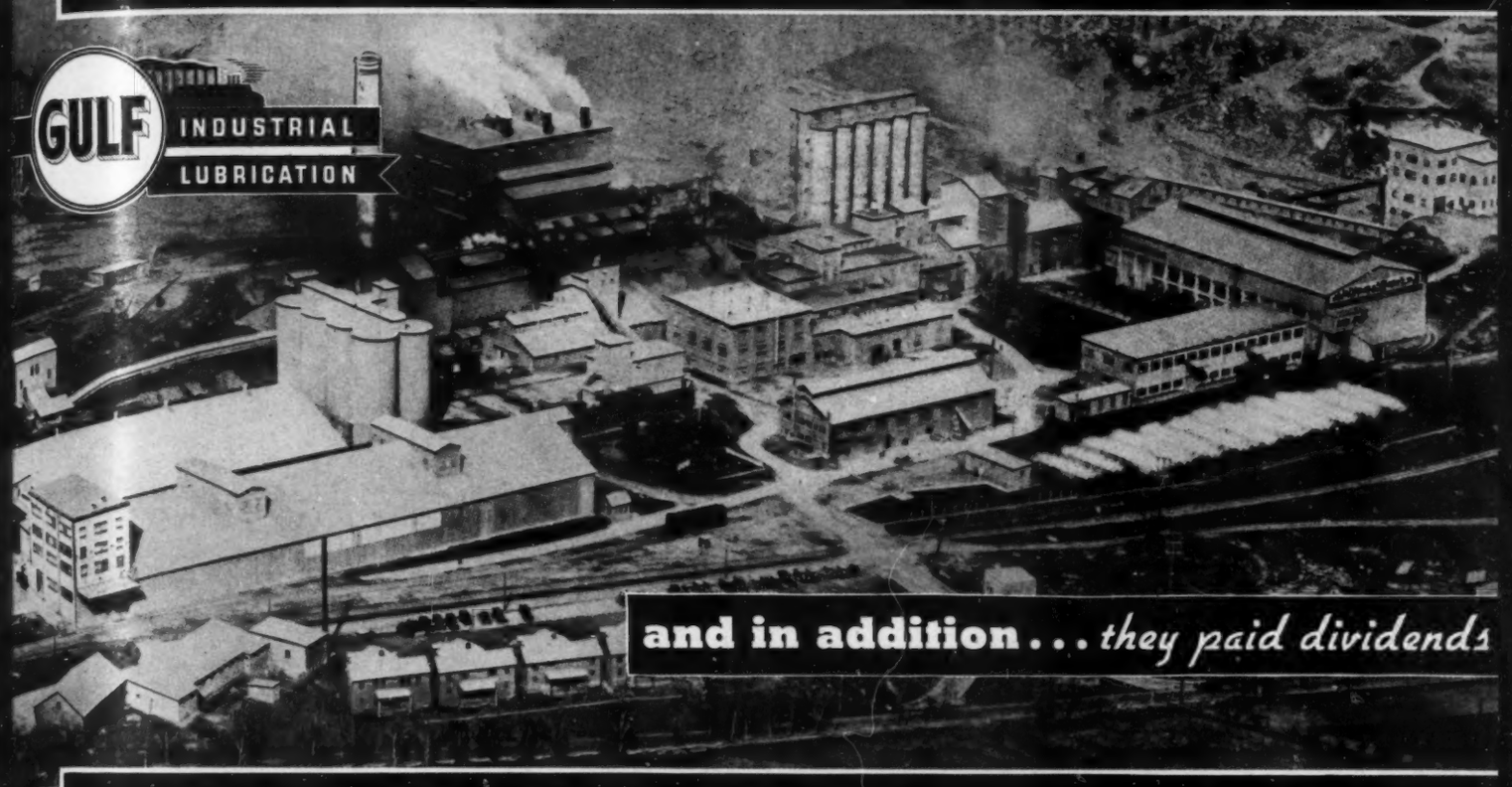
Robins Conveying Belt Co.
Belt Lacing (Steel)
Flexible Steel Lacing Co.
Belting (Elevator and Conveyor)
B. F. Goodrich Co.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.
Belting (Metal, Conveyor, High and Low Temperature)
Wickwire-Spencer Steel Co.
Belting (V Type)
B. F. Goodrich Co.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.
Belting (Transmission)
B. F. Goodrich Co.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.
Belts (Fan)
Firestone Tire & Rubber Co.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.
Bin-Dicator
Ripley Mfg. Co.
Bin Gates
Chain Belt Co.
Fuller Co.
Link-Belt Co.
Robins Conveying Belt Co.
Traylor Eng. & Mfg. Co.
Universal Road Machy. Co.
Bins
Blaw-Knox Co.
Pioneer Gravel Equipt. Mfg. Co. (Steel)
Universal Road Machy. Co.
Traylor Eng. & Mfg. Co.
Blasting Cap Protectors
B. F. Goodrich Co.
Blasting Machines
Atlas Powder Co.
Blasting Supplies
Atlas Powder Co.
Blasting Powder (See Powder, Blasting)
Blocks (Pillow, Roller Bearing)
Link-Belt Co.
S K F Industries, Inc.
Timken Roller Bearing Co.
Blocks (Sheave)
American Manganese Steel Co.
Boilers
Babcock & Wilcox Co.
Combustion Engineering Corp.
Boots and Shoes
B. F. Goodrich Co.
Brake Linings (Asbestos)
Firestone Tire & Rubber Co.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.
Breakers (Primary)
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.
Buckets (Clamshell, Grab, Orange Peel, etc.)
Blaw-Knox Co.
Hayward Company
Link-Belt Co.
Wellman Eng. Co.
Buckets (Dragline and Slackline)
American Manganese Steel Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Pioneer Gravel Equipt. Mfg. Co.
Wellman Eng. Co.
Buckets (Elevator and Conveyor)
Chain Belt Co.
Cross Engineering Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Buggies (Dump)
R. G. Le Tourneau, Inc.
Bulldozers
Blaw-Knox Co.
Koehring Co.
R. S. Le Tourneau, Inc.
Cableways
American Steel & Wire Co. (United States Steel Corp. Subsidiary)
Broderick & Bascom Rope Co.
General Electric Co.
Link-Belt Co.
Macwhyte Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.
Calcining Kettles (Gypsum)
J. B. Ehrsam & Sons Mfg. Co.
Calcium Chloride
Calcium Chloride Ass'n.
Cap Crimpers and Fuse Cutters
Ensign-Bickford Co.
Caps (Blasting)
Atlas Powder Co.
Car Pullers
Link-Belt Co.
Robins Conveying Belt Co.
Carriers
Barber-Greene Co.
Carryalls
R. G. Le Toureau, Inc.
Castings
Babcock & Wilcox Co.
Eagle Iron Works (Grey Iron)
Link-Belt Co.
Timken Roller Bearing Co.
Cement Making Machinery
F. L. Smidth & Co.
Cement Process
Cement Process Corp.
Cement Pumps
Fuller Co.
F. L. Smidth & Co.
Central Mixing Plants
Blaw-Knox Co.
Chain Belt Co. (Concrete)
Chain (Dredge and Steam Shovel)
Bucyrus-Erie Co.
Jeffrey Mfg. Co.
Chain (Elevating and Conveying)
American Manganese Steel Co.
Chain Belt Co.
Link-Belt Co.
Chain Drives
Chain Belt Co.
Chain Systems (Kilns)
F. L. Smidth & Co.
Chemicals
Calcium Chloride Ass'n.
Chute Lining
B. F. Goodrich Co.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.
Chutes and Chute Liners
American Manganese Steel Co.
Cross Engineering Co.
Chutes for Minimizing Segregation
Robins Conveying Belt Co.
Clarifiers
Dorr Co.
Classifiers
Dorr Co.
Hardinge Co., Inc.
Knickerbocker Co.
Link-Belt Co.
Clay Working Machinery
Bonnot Company
Clips (Wire Rope)
American Steel & Wire Co. (United States Steel Corp. subsidiary)
Broderick & Bascom Rope Co.
Macwhyte Co.
Williamsport Wire Rope Co.
Coal Crushers and Rolls
Williams Patent Crusher & Pulv. Co.
Coal Pulverizing Equipment
Babcock & Wilcox Co.
Bonnot Company
Bradley Pulverizer Co.
Gruendler Crusher & Pulv. Co.
Pennsylvania Crusher Co.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Williams Patent Crusher & Pulv. Co.
Compressed Air Hoists
Gardner-Denver Co.
Compressed Air Rock Drills
Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.
Compressors (See Air Compressors)
Concrete Slab Raising Equipment (Mud-Jack)
Koehring Co.
Concentrators (Slurry, etc.)
Dorr Co.
Conveyor Belting (See Belting)
Conveyor Idlers and Rolls
Barber-Greene Co.
C. O. Bartlett & Snow Co.
Chain Belt Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Conveyors and Elevators
Earle C. Bacon, Inc.
Barber-Greene Co.
Chain Belt Co.
Fuller Company
Jeffrey Mfg. Co. (Vibrating)
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
Pioneer Gravel Equipt Mfg. Co.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Road Machy. Co.
Conveyors (Pneumatic)
Fuller Company
Conveyors (Screw)
Link-Belt Co.
Coolers (See Kilns and Coolers, Rotary)
Correcting Basins
F. L. Smidth & Co.
Couplings (Air Hose)
Cleveland Rock Drill Co.
Couplings (Flexible and Shaft)
Chain Belt Co.
Link-Belt Co.
Couplings (Hose, Pipe, etc.)
B. F. Goodrich Co.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.
Cranes (Air Powered)
Curtis Pneumatic Machy. Co.
Cranes (Clamshell)
Bucyrus-Erie Co.
Harnischfeger Corp.
Koehring Co.
Cranes (Caterpillar)
American Hoist & Derrick Co.
Cranes (Crawler and Locomotive)
American Hoist & Derrick Co.
Bucyrus-Erie Co.
Koehring Co.
R. G. Le Tourneau, Inc.
Lima Locomotive Works, Inc (Ohio Power Shovel Co.)
Link-Belt Co.
Michigan Power Shovel Co.
Cranes (Excavator
Koehring Co.
Crusher Parts
American Manganese Steel Co.
American Pulverizer Co.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Crushers (Hammer)
American Pulverizer Co.
C. O. Bartlett & Snow Co.
Dixie Machy. Mfg. Co.
Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Williams Patent Crusher & Pulv. Co.
Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
Earle C. Bacon, Inc. (Jaw))
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.
Good Roads Machy. Corp. (Jaw)
Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co.
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Road Machy. Co.
Crushers (Reduction)
Bonnot Company
Jeffrey Mfg. Co.
Crushers (Ring)
American Pulverizer Co.
Crushers (Roll)
American Pulverizer Co.
Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
Pioneer Gravel Equipt. Mfg. Co.
Crushers (Rotary)
American Pulverizer Co.
J. B. Ehrsam & Sons Mfg. Co.

ALL THE LUBRICANTS

used in this Great Plant Last Year*

DIDN'T COST A PENNY...



4 REASONS
WHY GULF LUBRICANTS WILL GIVE YOU LOWER OPERATING COSTS

1 Gulf highest quality lubricants are refined by the ALCHLOR process. This famous process, patented and owned exclusively by Gulf, is the most thorough and effective method for removing the impurities and unsaturated hydrocarbons from lubricating oil.

2 Because of the highly selective treatment given to Gulf high quality lubricants, they have highest resistance to acidity, oxidation and gum-forming tendencies. Hence, they are more resistant to deteriorating influences and are longer lived.

3 When you use Gulf lubricants you receive the service of a trained lubrication engineer. He knows how to make machinery run more efficiently and can be of real assistance to you in solving your lubrication problems.

4 The Gulf engineer aims to reduce your maintenance and operating costs through improved lubrication practice. He strives to make savings in your *real* lubrication costs—as well as to reduce the total gallonage of lubricants consumed in your plant.

Use of Gulf Lubricants and Engineering Service Brought Savings in Maintenance Costs greater than the oil bill

HERE is the statement made by the management of the great plant shown above: "The use of Gulf quality lubricants and engineering service effected four major savings in our operating costs during 1935. They are: (1) reduced power consumption, (2) lower maintenance costs, (3) elimination of waste of lubricants and (4) lower cost for lubricants. *Our savings in maintenance alone have more than paid our lubricants bill!"*

Such records among Gulf users are not uncommon. Invariably, plant officials find that careful attention to lubrication not only reduces the cost for the lubricants themselves but *pays dividends*—in the form of operating economies.

Let a Gulf engineer demonstrate in your plant just how the scientific application of the proper lubricants, selected from Gulf's broad line, can make major savings in *your* operating costs. It is more than likely that lubrication practice in your plant is susceptible to further improvement.

GULF REFINING COMPANY, Pittsburgh, Pa.

District Sales Offices: BOSTON · NEW YORK · PHILADELPHIA
ATLANTA · TOLEDO · NEW ORLEANS · PITTSBURGH · LOUISVILLE

* *Name of plant and complete report on request.*

Makers of that Good Gulf Gasoline and Gulflube Motor Oil

Classified Directory—*Continued*

Crushers (Single Roll)
Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.

Crushing Rolls
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.
Jeffrey Mfg. Co.
Traylor Eng. & Mfg. Co.

Dedusters
Blaw-Knox Co.

Derricks and Derrick Fittings
American Hoist & Derrick Co.

Detonators
Atlas Powder Co.

Dewatering Machines
Dorr Co.

Diaphragms (Pump)
B. F. Goodrich Co.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.

Dippers (Manganese Steel)
American Manganese Steel Co.

Dippers and Teeth (Steam Shovel)
American Manganese Steel Co.
Bucyrus-Erie Co.
The Frog, Switch & Mfg. Co.

Dirt Moving Equipt. (Dumptor)
Koehring Co.

Ditchers
Barber-Greene Co.
Bucyrus-Erie Co.

Draglines
Bucyrus-Erie Co.
Link-Belt Co.

Draglines (Gasoline or Electric)
Koehring Co.

Dragline Excavators
Bucyrus-Erie Co.
Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)
Michigan Power Shovel Co.

Dragline Cableway Excavators
American Hoist & Derrick Co.
Bucyrus-Erie Co.
Link-Belt Co.
Sauerman Bros.

Dragline Excavators (Walking)
Bucyrus-Monighan Co.

Dredge Pumps (See Pumps, Dredging)

Dredges
American Hoist & Derrick Co.
Bucyrus-Erie Co.
Hayward Co.
Hetherington & Berner, Inc.
Morris Machine Works

Dredging Sleeves
B. F. Goodrich Co.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.

Drill Bits
Timken Roller Bearing Co.

Drilling Accessories
Cleveland Rock Drill Co.

Drills (Diamond Core)
Chicago Pneumatic Tool Co.

Drill Sharpening Machines
Gardner-Denver Co.

Drill Steel
Cleveland Rock Drill Co.

Drills
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drills, Hammer (See Hammer Drills)

Drills (Rock)
Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.

Drills (Tripod)
Cleveland Rock Drill Co.

Drills (Wagon)
Cleveland Rock Drill Co.

Drives (Short Center)
Allis-Chalmers Mfg. Co.

Dryers
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Bonnot Company
Combustion Engineering Corp
Hardinge Company, Inc.
Traylor Eng. & Mfg. Co.

Dumptors
Koehring Co.

Dust Collecting Systems
Allis-Chalmers Mfg. Co.
C. O. Bartlett & Snow Co.
Blaw-Knox Co.

Dust Conveying Systems
Fuller Company

Dynamite
Atlas Powder Co.

Electric Cables and Wires
American Steel & Wire Co. (United States Steel Corp. Subsidiary)
John A. Roebling's Sons Co.

Electric Mine Hoists
Nordberg Mfg. Co.

Electric Power Equipment
Allis-Chalmers Mfg. Co.
General Electric Co.

Elevator Belting (See Belting)

Engineers
Bonnot Company
Dorr Co.
Fuller Co.
Hetherington & Berner, Inc.
Productive Equipment Corp.
F. L. Smidth & Co.

Engines (Diesel)
Chicago Pneumatic Tool Co.
Nordberg Mfg. Co.

Engines (Gasoline, Kerosene and Oil)
American Hoist & Derrick Co.

Engines (Steam)
American Hoist & Derrick Co.
Morris Machine Works

Excavating Machinery (See Shovels, Cranes, Buckets, etc.)

Excavators (Crawling Tractor)
Koehring Co.

Excavators (Dragline)
Koehring Co.

Explosives
Atlas Powder Co.

Fans
General Electric Co.

Fans (Exhaust)
Jeffrey Mfg. Co.

Feeders
Babcock & Wilcox Co. (Pulverized Coal)
Chain Belt Co.
Fuller Co. (Cement and Pulverized Material)
Hardinge Company, Inc. (Weighing)
Jeffrey Mfg. Co. (Pan and Tube)
Pioneer Gravel Equipt. Mfg. Co.
Smith Engineering Works (Plate)

Forges (Oil)
Gardner-Denver Co.

Furnaces
Combustion Engineering Corp.

Fuses (Detonating and Safety)
Ensign-Bickford Co.

Fuses (Electrical)
General Electric Co.

Galvanized (Wire Strand)
Macwhyte Co.

Gaskets
B. F. Goodrich Co.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.

Gasoline
Texas Company

Gears and Pinions
Chain Belt Co.
General Electric Co.
Link-Belt Co.

Gears (Spur, Helical & Worm)
Jeffrey Mfg. Co.

Gelatin and Semi-Gelatin (See Explosives)

Grapples
Blaw-Knox Co.

Grapples (Stone)
Hayward Co.

Grease
Gulf Refining Co.
Texas Company

Grinding Balls
Babcock & Wilcox Co.
Jeffrey Mfg. Co.

Grizzlies
American Manganese Steel Co.
Jeffrey Mfg. Co. (Vibrating)
Productive Equipment Corp.
Robins Conveying Belt Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.

Grizzly Feeders
Jeffrey Mfg. Co.
Traylor Eng. & Mfg. Co.

Hammer Drills
Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.

Hammer Mills (See Crushers)

Hoists
American Hoist & Derrick Co.
Chicago Pneumatic Tool Co.
Curtis Pneumatic Machy. Co.
Gardner-Denver Co.
Link-Belt Co.

Hooks (Wire Rope)
Macwhyte Co.

Hose (Water, Steam, Air Drill, Pneumatic, Sand Suction and Discharge)
Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Firestone Tire & Rubber Co.
B. F. Goodrich Co.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.

Hydrators
Blaw-Knox Co.

I-Beam Trolleys
Curtis Pneumatic Machy. Co.

Indicators (Bin)
Ripley Mfg. Co.

Insulation (Electric)
General Electric Co.

Kilns (Shaft)
Hardinge Company, Inc.

Kilns and Coolers (Rotary)
Allis-Chalmers Mfg. Co.
Blaw-Knox Co.
Bonnot Company
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.

Kominuters (See Mills)

Lamp Guards
Flexible Steel Lacing Co.

Lighters, Hot Wire (For Safety Fuse)
Ensign-Bickford Co.

Lime Handling Equipment
Fuller Company
Link-Belt Co.
Raymond Bros. Impact Pulv. Co.

Lime Kilns (See Kilns and Coolers, Rotary)

Linings (Iron for Ball and Tube Mills). See Mill Liners)

Linings (Rubber for Chutes, Ball and Tube Mills, Tank and Pipe)
B. F. Goodrich Co.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.

Loaders and Unloaders
Barber-Greene Co.
Bucyrus-Erie Co.
Fuller Company
Jeffrey Mfg. Co.
Link-Belt Co.

Locomotive Cranes (See Cranes, Crawler and Locomotive)

Locomotives (Diesel)
The Fate-Root-Heath Co.
Plymouth Locomotive Works

Locomotives (Diesel-Electric)
The Fate-Root-Heath Co.
Plymouth Locomotive Works

Locomotives (Electric)
Jeffrey Mfg. Co.

Locomotives (Gas-Electric)
The Fate-Root-Heath Co.
Plymouth Locomotive Works

Locomotives (Geared)
Lima Locomotive Works, Inc.

Locomotives (Oil-Electric)
The Fate-Root-Heath Co.
Plymouth Locomotive Works

Locomotives (Storage Battery)
General Electric Co.
Jeffrey Mfg. Co.

Locomotives (Steam, Gas and Electric)
General Electric Co.
Lima Locomotive Works, Inc.
Plymouth Loco. Works (Gas)

Log Washer
McLanahan & Stone Corp.
Smith Engineering Works

Lubricants
American Steel & Wire Co. (United States Steel Corp. Subsidiary) (Wire Rope)
Broderick & Bascom Rope Co. (Wire Rope)
Gulf Refining Co.
Macwhyte Co. (Wire Rope)
Texas Company

Machinery Guards
Harrington & King Perforating Co.

Magnets
General Electric Co.

Magnetic Pulleys
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.

Manganese Steel Castings
American Manganese Steel Co.
The Frog, Switch & Mfg. Co.

Manganese Steel Parts
American Manganese Steel Co.

Mechanical Rubber Goods
Firestone Tire & Rubber Co.
B. F. Goodrich Co.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.

Mill Liners and Linings (Iron for Ball and Tube Mills)
Babcock & Wilcox Co.
Jeffrey Mfg. Co.
F. L. Smidth & Co.

Mills, Grinding (Ball, Tube, etc.) (See also Crushers, Hammer)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bonnot Company
Bradley Pulverizer Co.
Gruendler Crusher & Pulv. Co.
Hardinge Co., Inc.
Knickerbocker Co.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Mine Car Hitchings
Macwhyte Co.

Mine Handling Equipment
Chain Belt Co.

Mixers (Commercial Concrete)
Jaeger Machine Co.

Mixers (Concrete)
Gruendler Crusher & Pulv. Co.
Koehring Co.

Motors and Generators (Electric Units)
Allis-Chalmers Mfg. Co.
General Electric Co.

Multiple V Belts
B. F. Goodrich Co.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.

Nozzles (Gravel Washing)
Chain Belt Co.

Oil Burners
Babcock & Wilcox Co.
F. L. Smidth & Co.

Oils (Lubricating)
Gulf Refining Co.
Texas Company

Overhead Traveling Cranes
Curtis Pneumatic Machy. Co.

Packings (Pump, Valve, etc.)
B. F. Goodrich Co.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.

Paint (Asphalt)
Texas Company

Pavers (Concrete)
Koehring Co.

Classified Directory—*Continued*

Perforated Metal
Chicago Perforating Co.
Cross Engineering Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.
Wickwire-Spencer Steel Co.

Plates (Double Corrugated)
Hendrick Mfg. Co.

Pneumatic Drills (See Drills)

Portable Conveyors
Barber-Greene Co.
Fuller Company
Link-Belt Co.
Robins Conveying Belt Co.

Portable Crushing and Screening Unit
Good Roads Machy. Corp.
Pioneer Gravel Equipt Mfg. Co.
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Portable Loaders
Jeffrey Mfg. Co.

Powder (Blasting)
Atlas Powder Co.

Power Transmission Equipment
Chain Belt Co.
S K F Industries, Inc.

Pulleys, Magnetic (See Magnetic Pulleys)

Pulverators
Allis-Chalmers Mfg. Co.

Pulverizers (See also Crushers, Mills, etc.)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Babcock & Wilcox Co.
Bonnot Company
Bradley Pulverizer Co.
Dixie Machy. Mfg. Co.
Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
Knickerbocker Co.
Pennsylvania Crusher Co.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Universal Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Pulverizer Parts
American Manganese Steel Co.

Pumps (Air Lift)
Fuller Company

Pumps (Cement)
Fuller Company

Pumps (Cement Slurry)
American Manganese Steel Co.
Dorr Co.
Morris Machine Works
F. L. Smidth & Co.
A. R. Wilfley & Sons

Pumps (Centrifugal)
Allis-Chalmers Mfg. Co.
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
Morris Machine Works
A. R. Wilfley & Sons

Pumps (Dredging)
American Manganese Steel Co.
Bucyrus-Erie Co.
Morris Machine Works

Pumps (Pulverized Coal)
Babcock & Wilcox Co.

Pumps (Sand and Gravel)
Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
Morris Machine Works
A. R. Wilfley & Sons

Railways (Electric)
General Electric Co.

Railway Equipment
General Electric Co.

Ready Mixed Concrete (Truck Mixer Bodies)
Blaw-Knox Co.
Chain Belt Co.

Ready Mixed Concrete Plants
Blaw-Knox Co.

Reinforcement Fabric (Concrete)
Wickwire-Spencer Steel Co.

Rims (Wheel)
Firestone Tire & Rubber Co.

Road Binder
Calcium Chloride Ass'n.

Road Machinery
American Hoist & Derrick Co.
Barber-Greene Co.
Blaw-Knox Co.
Koehring Co.

Rock Bits (See Drill Bits)

Rock Drills (See Drills, Rock)

Rod Mills
Traylor Eng. & Mfg. Co.

Rods (Wire)
Wickwire-Spencer Steel Co.

Roller Bearings
S K F Industries, Inc.
Timken Roller Bearing Co.

Rollers
R. G. Le Tourneau, Inc.

Roofing (Ready to Lay)
Texas Company

Roofing and Siding (Steel)
Joseph T. Ryerson & Son, Inc.

Rope, Wire (See Wire Rope)

Rubber Covered Screens
B. F. Goodrich Co.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc.

Sand Drag
Smith Engineering Works

Sand Settling Tanks
Link-Belt Co.
Pioneer Gravel Equipt. Mfg. Co.
Smith Engineering Works

Scrapers (Power Drag)
Blaw-Knox Co.
Link-Belt Co.
R. G. Le Tourneau, Inc.
Pioneer Gravel Equipt. Mfg. Co.
Sauerman Bros.

Screens
Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Audubon Wire Cloth Corp.
Earle C. Bacon, Inc.
C. O. Bartlett & Snow Co.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Cross Engineering Co.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
National Wire Cloth Co.
Nordberg Mfg. Co.
Pioneer Gravel Equipt. Mfg. Co.
Productive Equipment Corp.
Robins Conveying Belt Co.
John A. Roebling's Sons Co.
Simplicity Eng. Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Road Machy. Co.
Universal Vibrating Screen Co.

Screens, Scalping (Hercules and Standard)
Smith Engineering Works

Screens (Vibrating)
Jeffrey Mfg. Co.
Link-Belt Co.
Nordberg Mfg. Co.
Productive Equipment Corp.
Robins Conveying Belt Co.
Simplicity Eng. Co.
Smith Engineering Works
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Screens, Washing (Hercules, Ajax and Standard)
Smith Engineering Works

Screens (Woven Wire)
Wickwire-Spencer Steel Co.

Screw Rewasher (Single and Twin)
Smith Engineering Works

Scrubbers, Washers
Allis-Chalmers Mfg. Co.
Knickerbocker Co.
Hardinge Company, Inc.
Smith Engineering Works

Seal Rings
Traylor Eng. & Mfg. Co.

Separators (Magnetic)
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.

Separators (Slurry)
F. L. Smidth & Co.

Shovels, Power (Steam, Gas, Electric, Diesel, Oil)
Bucyrus-Erie Co .
Koehring Co.
Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)
Link-Belt Company
Michigan Power Shovel Co.

Silos
F. L. Smidth & Co.

Skip Hoists and Skips
Link-Belt Co.
Robins Conveying Belt Co.

Slings (Wire Rope)
American Steel & Wire Co. (United States Steel Corp. Subsidiary)
A. Leschen & Sons Rope Co.
Macwhyte Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Sockets (Wire Rope)
American Steel & Wire Co. (United States Steel Corp. Subsidiary)
Macwhyte Co.

Soft Stone Eliminator
Knickerbocker Co.

Speed Reducers
Link-Belt Co.
Traylor Eng. & Mfg. Co.

Springs (Extension, Compression, Torsion or Flat)
Wickwire-Spencer Steel Co.

Sprockets and Chain
Chain Belt Co.
Jeffrey Mfg. Co.

Steam Shovel Repair Parts
American Manganese Steel Co.

Steel (Abrasion Resisting)
Joseph T. Ryerson & Son, Inc.

Steel Bars
Timken Roller Bearing Co.

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Joseph T. Ryerson & Son, Inc.

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Steel (Special Alloy)
Timken Roller Bearing Co.

Steel (Special Analysis)
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Cleveland Rock Drill Co.

Stokers
Babcock & Wilcox Co.
Combustion Engineering Corp.

Tanks
Combustion Engineering Corp.
Dorr Co.
Link-Belt Co.

Thickeners
Dorr Co.

Thimbles
Macwhyte Co.

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Firestone Tire & Rubber Co.

Tires and Tubes
Firestone Tire & Rubber Co.
B. F. Goodrich Co.

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Nordberg Mfg. Co.

Track Shifters
Nordberg Mfg. Co.

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Kansas City Hay Press Co.
Koehring Co.

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Broderick & Bascom Rope Co.
A. Leschen & Sons Rope Co.
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Transmission Machinery
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Timken Roller Bearing Co.

Trenchers
Barber-Greene Co.

Trukmixers
Blaw-Knox Co.

Trucks (Mixers)
Blaw-Knox Co.
Jaeger Machine Co.

Truck Bodies (Ready Mixed Concrete)
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Jaeger Machine Co.

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Tube Mill Liners (See Mill Liners)

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B. F. Goodrich Co.
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Tubing (Seamless Steel)
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Nordberg Mfg. Co.

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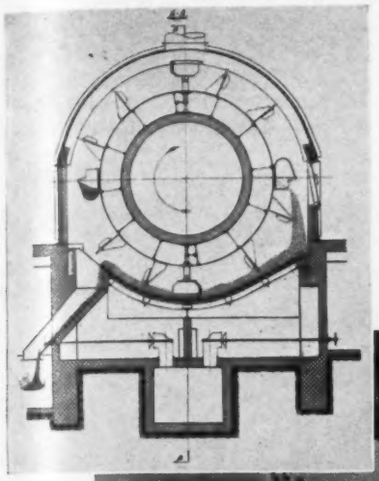
Wire Rope Slings (See Slings, Wire Rope)

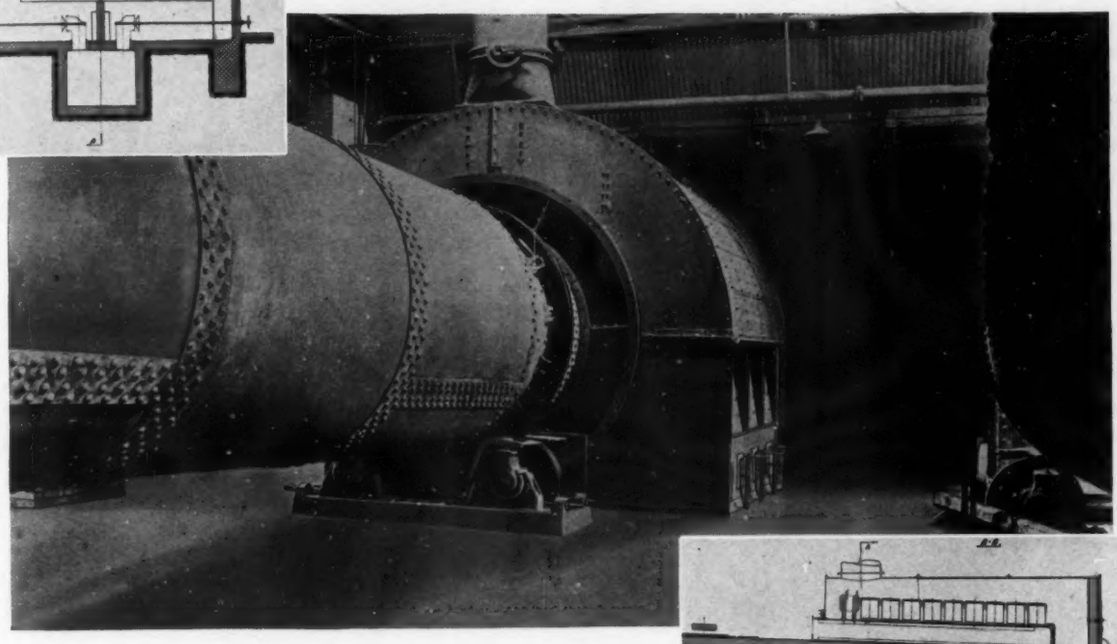
Wire Rope Sockets (See Sockets, Wire Rope)

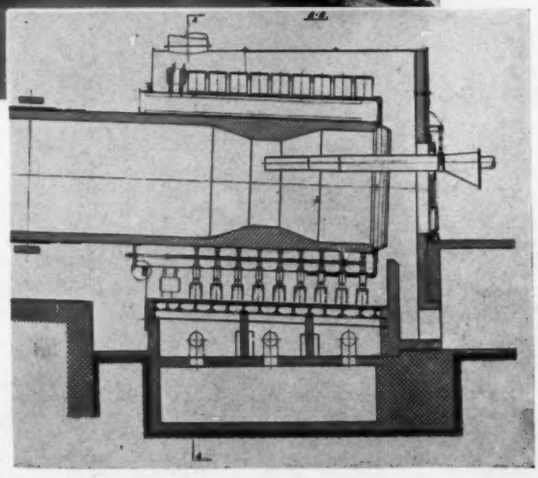
THE NEW CLINKER COOLER



AIR QUENCHING TYPE
INTEGRAL WITH KILN

"UNAX GRATE COOLER"





Advantages

Rapid, efficient cooling of product.
Increase in fuel economy of the kiln.
Increase in grindability of clinker.
Improvement in quality of the cement.
Low first cost, low maintenance cost.

THE UNAX GRATE COOLER consists of: A stationary part comprising a casing surrounding the outlet end of the kiln and containing a stationary grate; a revolving part consisting of conveying flights and scoops attached to and rotating with the kiln, spreading the clinker over the grate through which cooling air is passed. The heated air is used for combustion in the kiln. The longest kilns in the world (512 ft. and 520 ft.) are equipped with these coolers.

F. L. SMIDTH & CO.

Engineer Specialists in Designing and Equipping Cement Making Factories

225 BROADWAY **NEW YORK, N. Y.**

GAYCO

BETTER THAN EVER

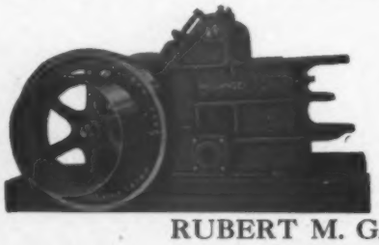
RELIANCE

CENTRIFUGAL AIR SEPARATOR

Now you get 25 to 40% increased capacity with 25 to 30% greater recovery of fines. Product is more uniform—you get increased capacity —cleaner tailings and higher efficiency than is possible with any other air separator. Delivers products of any desired screen analysis from 60 to 400 mesh.

Many of these machines have been running 24 hours per day for years without interruption. Rugged construction plus high quality, wear-resisting material assures long, efficient, economical service.

RELIANCE ALL-STEEL CRUSHER



The one crusher that can "take it." The first Reliance All-Steel Crusher built more than 20 years ago—is still earning profits. That's the kind of service correct design — wear-resisting material and rugged construction results in. Ask for full details.

RUBERT M. GAY
DIVISION OF
UNIVERSAL ROAD MACHINERY CO.
Sales Office: 114 Liberty St., New York, N.Y. Factory: Kingston, N.Y.

Also Manufacturers of:

Bucket Elevators	Heating Kettles	Sand, Gravel Spreaders
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Coal Breakers	Revolving Screens	
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Gentlemen:
Please send me further details and specifications on the equipment checked below:

.....GAYCO RELIANCE AIR SEPARATORS
.....RELIANCE CRUSHERS
.....(Other equipment listed above)

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Name..... Title.....

Address ....

The MORRIS HYDRAULIC COLUMN

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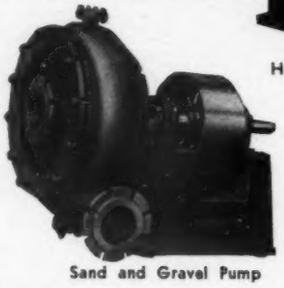
Vertical Non-clogging Pump

Multistage Pump

Horizontally Split Double Suction Pump



Sand and Gravel Pump

Slurry or Sludge Pump

57 Varieties . . . .

This well-known slogan could be used for Morris Pumps. Morris makes a pump for every purpose—for clear water, chemicals, pulpy materials, fine abrasives, sand and gravel. And behind each Morris Pump type is 72 years of pump building—the unequalled experience of the oldest American manufacturer of centrifugal pumps. The results of this experience are shown in the many distinctive Morris features that give you long continued as well as initial high efficiency, low maintenance expense and trouble-free operation. Be sure to ask for a Morris quotation before you buy a centrifugal pump.

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Here is one bulletin that every user of centrifugal pumps and dredges should have. It is a picture book guide to practically every type of centrifugal pump and illustrates a wide range of designs and methods of drive.

Whether you use pumps to handle clear water, chemicals, abrasive mixtures or pulpy materials, or dredges for any service, you will find the most modern design for the purpose illustrated in this concise guide book. Your copy sent on request.

For authoritative recommendations on any pumping or dredging problems, write to Morris Machine Works, Baldwinsville, N. Y. Representatives in principal cities.

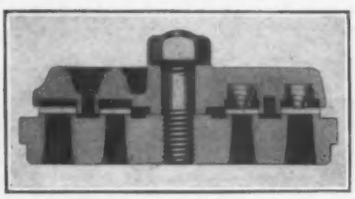
Get More Air More DEPENDABLY For YOUR Quarry

Gardner-Denver Duplex Horizontal Compressor

Showing connection to synchronous motor

If your air requirements are large, choose a compressor that will keep on meeting them—month after month, year after year. Gardner-Denver "HA" Duplex Compressors combine big capacity with utmost reliability. Here's why—

- **Embraces all the latest accepted features in up-to-the-minute compressor design. Better balance — inertia loads reduced to the minimum — smoother operation — highest possible efficiency.**
- **Nickel-alloy iron cylinders provide longer wear—less affected by temperature changes.**
- **Timken tapered roller main bearings—no shaft wear and practically no friction. The first manufacturer to adopt this feature. The less efficient plain bearings in other makes are becoming obsolete.**



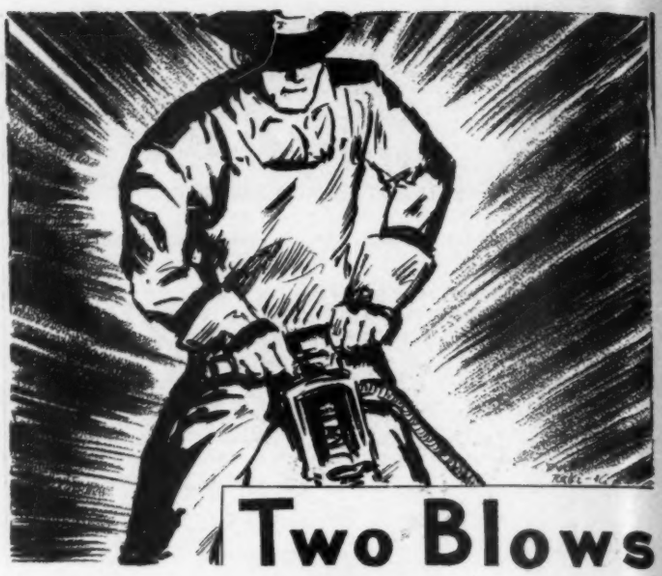
CUSHIONED DUO-PLATE VALVES

Tested under all operating conditions . . . thoroughly proved by years of service . . . thousands now in successful operation. Closing impact reduced to minimum, due to light weight and low lift. No flexing or sliding action to cause breakage. Valves become tighter with use and do not wear into seats.

GARDNER-DENVER CO., 102 Williamson St., Quincy, Ill.

Since 1859

GARDNER-DENVER



Two Blows or One . . .

In the breaking up of rock, concrete or asphalt the power method exceeds the feeble hand hammer and chisel method.

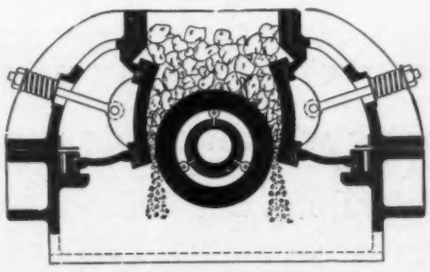
A decided advantage in the crushing of rock is best illustrated by the superior design and performance of the powerful BONNOT CRUSHER which delivers TWO BLOWS INSTEAD OF ONE. Each blow is struck with maximum force and results in maximum Crushing effect. The BONNOT CRUSHER strikes 750 BLOWS PER MINUTE.

Operators profit by the saving in maintenance due to the rugged construction and quality, wear-resisting Manganese Steel Wearing Parts. The Wear is Distributed Over Entire Crushing Area. Action is Continuous—Power Consumption is Low.

The BONNOT Crusher can be started fully loaded and requires only 1/2 to 1/3 the usual head-room and no more floor space than crushers of similar capacity.

NOTE: The BONNOT CRUSHER makes material in ONE PASS as compared with slabby material produced by ordinary crushers.

Read what users of BONNOT CRUSHERS have to say—you'll find their comments in our illustrated BONNOT BULLETIN NO. 150. Write for your free copy today.



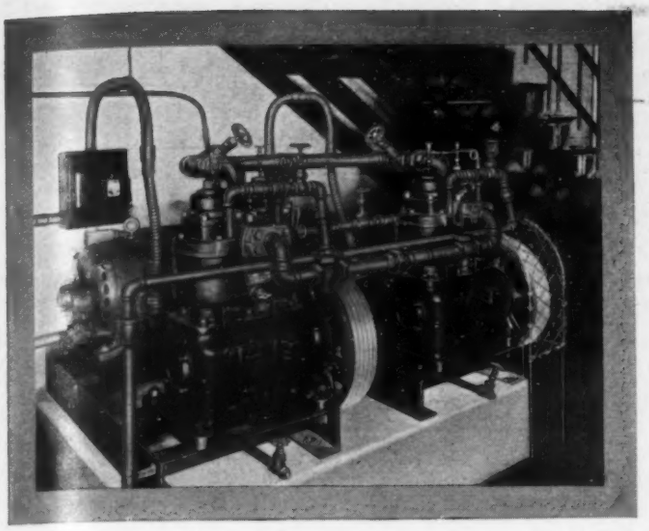
Not a roll crusher. Featuring slow creep mantle for distribution of wear

Manufactured under U. S. Patent No. 1946763

THE BONNOT CO.
CANTON, OHIO

— SINCE 1891 —

New York Office: 30 Church St.



Curtis compressors have *Stamina*

Performance records prove that Curtis Compressors have a brute-like stamina under hard service conditions. They maintain their high efficiency over long periods of continued operation under capacity loads, because of their unusual reserve strength. Adjustments are simple, and infrequent.

The result for you is low compressed air costs — increased profit.

——CURTIS FEATURES——

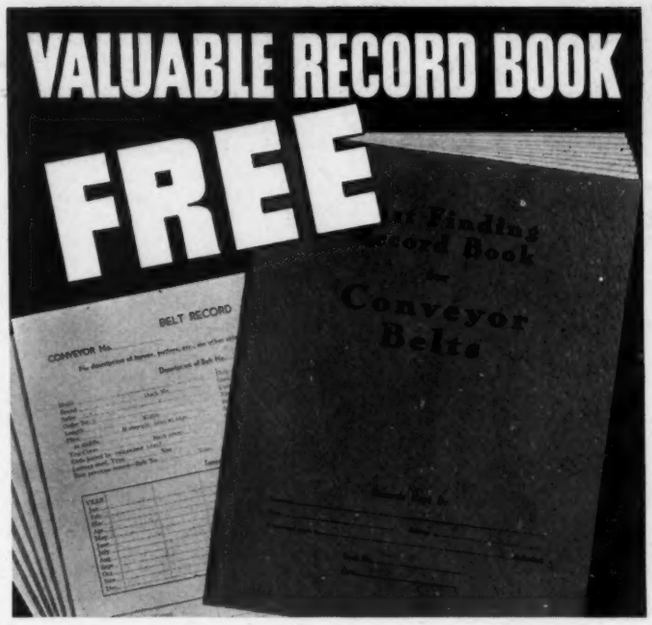
- Timken Roller Bearings.
- Carbon-free Disc valves.
- Centro-ring oiling.
- Fully enclosed.
- All parts readily accessible.
- Capacities up to 360 CFM.

Write for Bulletin C4B and surveys giving facts and figures on actual performance records of Curtis installations.

CURTIS PNEUMATIC MACHINERY CO.
1988 Kienlen Avenue, St. Louis, Mo.
New York Chicago San Francisco

CURTIS

COMPRESSORS • AIR HOISTS
I-BEAM CRANES and TROLLEYS



Cost-Finding Record System for Conveyor Belts with valuable engineering data on selection, installation and maintenance of belts. 28 pages of important information and money-saving record forms. Free to every user of conveyor belts, regardless of brand used. No obligation.

Save Money

Until you know *cost per ton handled* you cannot know your true cost of conveyor belts. This Record Book makes it easy to find exact cost per ton. Use the book and you will eliminate all guess-work from the buying of belts. You will *know* which type, size and brand is best on your particular conveyors.

Each Record Book contains space for complete records on 11 conveyor belts. Send for as many copies of the book as you need.

Why This Book is Free

Goodrich Conveyor Belt today has major improvements which add to its useful life, reduce its final cost. Prove it by testing Goodrich against any comparable belt made. We are so certain of the result that we gladly provide this free Record Book to make the test easy and positive.

But regardless of brand of belt you use or intend to use, send the coupon now, and *make sure* what belts are costing you.

THE B. F. GOODRICH COMPANY
Mechanical Rubber Goods Division, AKRON, OHIO

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THE B. F. GOODRICH COMPANY, 460 S. Main St., Akron, O.

Without obligating us in the slightest, send copy of your free Cost-Finding Record Book for Conveyor Belts.

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City ..... State .....

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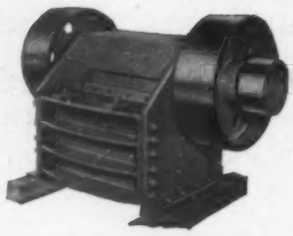
Title .....

Gruendler crushers and pulverizers are preparing rock for cement mill or aggregates. Uniform and at less cost per ton, due to improved features. In any capacity from 10 tons to 4,000 tons daily. All-steel construction and low upkeep cost.

Also Hammer Mills, Ring Mills, Roll Crushers, Jaw Crushers, Screen and Conveying equipment of most rugged design for long life.



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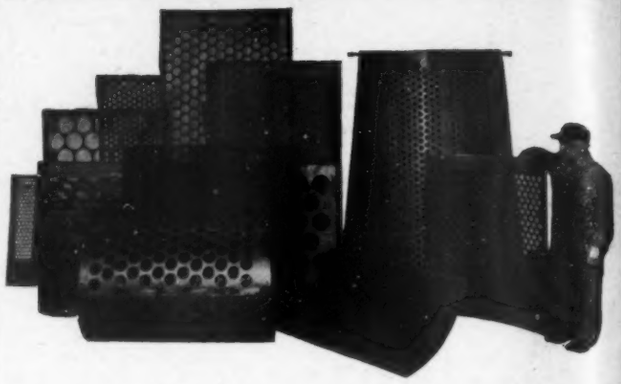
Equipment for Both Fixed and Road-side Plants

Send for Details

GRUENDLER CRUSHER & PULVERIZER CO.
R. P., 2915 N. Market St., St. Louis, Mo.
Since 1885

SCREENS of Perforated Metal



For Sand, Gravel, Stone and Ore. Perforations of all standard types, also of unusual sizes and layouts to give large production and reduced screening costs.

The Harrington & King Perforating Co.

5650 Fillmore St., Chicago, Ill. 114 Liberty St., New York, N. Y.

BIN-DICATOR

(Bin Level Indicator)

Automatic Indication and Control
of
Bulk Material Levels in Bins

Write for Complete Information
Reliable Agents Wanted

Manufactured by
RIPLEY MANUFACTURING CO.
Wayne, Michigan

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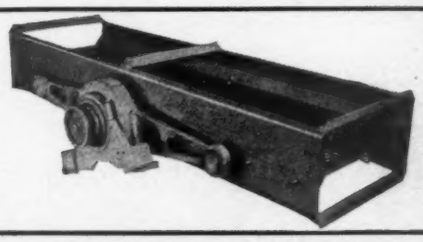

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CONTROLLED VIBRATION
Efficient — Rugged — Economical
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Productive Equipment Corporation
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H&B COMPLETE HYDRAULIC DREDGES H&B

SAND AND GRAVEL DREDGING PUMPS
AGITATING MACHINERY
DREDGE HOISTS
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PIPE LINE ACCESSORIES

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GOOD USED EQUIPMENT

Selected Special Items

6—24" Robins Belt Conveyors—56', 80', 85', 105', 108', 258' C/C. Complete.
6—Sturtevant Jaw Crushers, 6x20, 7x24, 10x15, 14x26.
1—No. 1260 Bakstad Jaw Crusher, 12x30" feed, 12x60 dis. to ½".
10—Farrel Jaw Crushers—4x10, 13x30, 36x42, 42x60.
15—Jaw Crushers—36x42 Traylor, 40x42 Worthington, 48x60 Allis Chalmers-Blake; large selection smaller sizes.
4—Symons Cone Crushers, 2', 3', 5½' 7'.
4—6" and 10" McCulley Fine Reduction Crushers.
2—10" Pumps, each with 400 H.P. 3/60/2200 synchronous motor, 4000 g.p.m., 240' head.
16—Tyler Hummer Screens, 4x5', No. 31.
8—3x5', 4x5', 4x7' Tyler Screens.
2—Tyler Generator Sets, G-4, G-8.
5—4x6', 5x8' Niagara Roller-Bearing Screens; 3x6', Unused.
3—24"x20" Jeffrey type B Hammer Mills.
1—30"x24" Jeffrey type A Hammer Mill.
1—36"x36" No. 4XC Gruendler Hammer Mill, roller bearings.
4—6'x40' Direct Heat Rotary Dryers.
1—8'8"x85' Ruggles-Coles Class "A" Rotary Dryer; also 5x26' rebuilt at our shops.
2—Raymond High Side Roller Mills, 3- and 5-roll.
1—6'x60' Bonnot Rotary Kiln and Cooler.
1—7'x100' Vulcan Rotary Kiln.
7—Raymond Pulverizers, Nos. 0000, 00, 1, 3.
8—Hardinge Ball and Pebble Mills, 4½'x16', 6x22, 6x36, 7x36, 8x30.
1—3'x12' Hendy Tube Mill, iron lined.
4—UNUSED 4'x8' Kennedy Ball Mills, with full equipment, including Burners for Coal Pulverizing.
1—4'x8' Kennedy Mill, as above. Used.
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2—6x8', 8x8' Dorrco Vacuum Filters.
1—10' Clyde Lime Hydrator.
2—5' Gayco Air Separators, Latest Model.

Just a Partial List.

SEND FOR BULLETIN of our regular stock of Crushers; Vibrating Screens; Ball, Rod and Tube Mills; Air Compressors; Rotary Kilns and Dryers; Hardinge Ball and Pebble Mills; Raymond and other Pulverizers; Air Classifiers; Thickeners; Wet Classifiers; Filter Presses; Continuous Filters, etc.

CONSOLIDATED PRODUCTS COMPANY, INC.
15-16-17 Park Row New York City
Shops at Newark, N. J., cover 8 acres.

Two Robins 24"x225' Belt Conveyors.
Robins 18"x170' Belt Conveyor.
Conveyor Idlers and Pulleys, 18" and 24".
Portable 14"x24' Flat Conveyor, LeRoi.
Conveyor Trippers for 18" and 24" belt.
Telsmith 20" Plate Feeder.
Digging Truck Loader, Fordson traction.
Conveyor Belt and Elevator Buckets.
Chain Bucket Elevators, 10" and 12" wide.
Haiss and Owen ¾-yd. Clamshell Buckets.
¾-yd. Tipover Buckets and 3-yd. Grout Boxes.
Mitchell 3x8 Vibrating Screen, 3 ph., 220 v.
Buda 35 hp., 4-cyl., Gasoline Engine.
LeRoi 6 to 8 hp., 2-cyl. Gasoline Engine.
Chicago Steam Air Compressor, 10x12x10.
Jeffrey No. 3 Jaw Crusher and Hammer Mill.
Link-Belt Coal Crushing Rolls, teeth.
Kennedy No. 37 Gearless Gyratory Crusher.
Ingersoll-Rand No. 33 Leyner Drill Sharp'r.
Backhoe & Skimmer Attach. for Bearcat.
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Link-Belt 16"x25' Belt Conveyor, Steel.
Goulds 8" Centrif. Pump, Electric, 22 hp.
Swivel 24" Gauge End Dump Cars, ¾-yard.
V-shaped Steel Cars for 24" and 36" Gauge.
Portable 24" Gauge Track and Switches.
Hoists: Gasoline, Electric and Steam.
Chain Hoists: 10-ton, 8-ton and 5-ton.
Beaumont 2-drum, 60 hp., A.C. Dragline Hoist.
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Ingersoll-Rand Air Compressor, ER-1, 9x8.
Air Drills, Jackhammers and Drill Steel.

G. A. UNVERZAGT
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2-yd. Marion 480 Shovel-Crane.
1¼-yd. Byers Shovel-Crane.
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1-yd. Koehring Crane.
¾-yd. P. & H. Shovel-Crane.
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½-yd. Thew-Universal Crane.
48 Steel Stone Skips 3 and 4 yd.
Compressors: 1300, 1245, 1190, 450, 310, 265, 250, 110 ft.
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Crushers: Telsmith 13A, 40.
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Derricks—All steel:
3 Guy 15 ton 115 mast, 100 ft. boom.
2 Stiff-leg 10 and 15 ton, 90 ft. boom.
Drill sharpener, furnace and grinder.
Orange Peel and Clamshells: 2, 1½, 1¼, 1, ¾ yd.
Pumps: 1,000 to 5,000 gal.
3—12 ton 36" gauge gas locomotives.

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500 Brisbane Bldg. Buffalo, N. Y.

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1½ mile 30-lb. ASCE portable track, 30' lengths, Bethlehem Steel mine ties; 14 cars like new, Easton, 2 cu. yd. V-shape, all-steel, heavy-duty; 10 Easton 1½ cu. yd. 30" ga. V-shape cars.

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P. O. Box 1234, Pittsburgh, Pa.

FOR SALE

LOCOMOTIVE, 1 5-ton Vulcan, Loco. No. 3872, Engine No. 43793, 36" gauge. Used one season.

SIDE DUMP CARS, 16, 36" gauge, all steel 1½-yd.

All equipment in good condition.

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Motors and Generators, A.C. and D.C., for sale at attractive prices. New and Rebuilt. All fully guaranteed. Write for List and Prices.

V. M. NUSSBAUM & CO.,
Fort Wayne, Indiana

LOCOMOTIVES

3—50-ton American 4-wheel saddle tanks, 16x24" cylinders, Code boilers, one built 1927.
4—40-ton American 4-wheel saddle tanks 14x22" cylinders, Code boilers, one built 1924.
5—40-ton Baldwin 4-wheel saddle tanks, 14x22" cylinders, Code boilers, built 1924.

LOCOMOTIVE CRANES

1—30-ton American 8-wheel, built 1925.
1—25-ton American, 8-wheel, built 1923.
1—20-ton Industrial, 8-wheel, built 1924.
All have Code boilers.

DUMP CARS

20—30-yard Western all-steel air lift door 2-way side dumps.

Complete stock list on request.

BIRMINGHAM RAIL & LOCOMOTIVE COMPANY
BIRMINGHAM, ALABAMA

(Classified Advertising Continued on Next Page)

Continued from Preceding Page

USED EQUIPMENT

"E.C.A. REBUILT"

QUARRY and GRAVEL PLANT EQUIPMENT

AIR COMPRESSORS

Portable and stationary, belt, with elec. or gas. power, sizes from 21 cu. ft. to 1,000 cu. ft.

BUCKETS

246—Buckets, all sizes and makes.

CARS

Large lot including std. ga. 6- and 12-yd. and 20-yd., 36-ga. 5-yd., and 24-ga. 1½-yd. Also std. ga. flat cars and ballast cars.

48—Koppel quarry cars, 42" ga. 2½-yd. One-way side dump.

CONVEYORS and ELEVATORS

9—Port. belt conveyors with steel frame, gas. or elec. pr. 18 and 24 in. Barber-Greene and Chic. Automatic.

11—Bucket elevators: 6 Chain Belt Co., Weller and Link-Belt vertical enclosed type; capacities from 35 to 117 tons per hour. 5—Weller inclined type. Nos. 3, 4, 5 and 6 up to 170 yds. per hr.

CRANES (Locomotive)

5—Locomotive cranes; sta. ga., 30 and 25 tons; Ohio, Browning, American, Industrial.

CRANES and DRAGLINES

1—Industrial Brownhoist Model DC Diesel crane, Serial 5176, 60-ft. boom, 1¼-yd. bucket.
1—Northwest Model 104, Ser. 2079, 45-ft. boom, 1¼-yd. dragline or clamshell.
2—Osgood No. 2054, 2069, with 40-ft. boom, 1 with 1-yd. shovel front.
1—Brownhoist No. 2, Ser. 9964, 40-ft. boom, 1-yd. bucket.
1—Link Belt K-1, Ser. 1024, 50-ft. boom, 1-yd. bucket.
1—Industrial Brownhoist type CC, Ser. 5071, 36-ft. boom, ½-yd. bucket.

CRUSHERS

1—Symons coarse cone crusher, size No. 5½, SU No. 521.
1—Set P & M crushing rolls, size 42x16".
2—McCulley No. 3 gyratory crushers.

DERRICKS

Steel and wood, stiff leg, or guy; from 2 to 50 tons, including 2 steel stiff legs; 1—10-ton Insley 80-ft. boom and 1—10-ton American 80-ft. boom.

DRILLS and DRILL SHARPENERS

3—Gardner Denver wagon or derrick drills with Model 21 or 17 Gardner drills for channelling.
25—Ingersoll-Rand and Sullivan jackhammer, column, and tripod drills.

HOISTS

(Electric and Gas)

55—Electric, ranging from 20 HP. up to 125 HP., consisting of triple-drum, double-drum and single-drum with A.C. or D.C. mtrs., some with attached swingers.
38—Gas hoists, ranging from 8 to 120 HP., single, double and triple-drums; all standard makes.

LOCOMOTIVES

32—Gasoline locomotives from 14-ton to 2-ton standard 36 and 24-ga.
3—Steam saddle tank locomotives; 1—24-ton Porter, cyl. 12x16"; standard ga., Ser. No. 5093; 1—19-ton Davenport, cyl. 10x16 std. ga. Ser. No. 2036; 1—20-ton Porter, cyl. 11x16, 36-ga. Ser. No. 6753.

PUMPS

All sizes and types, both force, centrifugal and steam.

SHOVELS

1—Industrial Brownhoist Type DC No. 5176 Buda Diesel eng., 1¼-yd. cap.
1—Northwest Model 105 combination shovel and crane, No. 1846, ⅞-yd. shovel dipper, 40' crane boom.
3—Link-Belt shovel attachments for K-55, K-44, K-42, K-38 or K-2.

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USED EQUIPMENT

FOR SALE

12—5-yd. 36" ga. Western Dump Cars.
6—3-yd. 36" ga. Koppel Steel V Dump Cars.
4—1½-yd. 36" ga. Insley Steel V Dump Cars.
2—3½-ton 36" ga. Whitcomb Gasoline Locomotives.
1—9x10 Sturtevant Vertical Steam Engine.
1—10x10x12 Ingersoll Steam-Driven Air Compressor.
1—9x10 Lidgerwood 3-Drum Steam Hoist.
1—8¼x8 Lidgerwood S.D. Steam Hoist.
22—12-yd. Western std. ga. Air or Hand Dump Cars.
2—40-ton Baldwin S.T. Locomotives, 14x22 cyls.
Rails—First-Class Relay Rails and Bars, 60, 70, 80, 85, 90 and 100 lb. Rails, Tie Plates, etc.

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BARGAINS

THOMAS 12" x 14" STEAM HOIST
Double Drum Without Boiler.

THOMAS 100 H. P. 2-SPEED
Electric Slackline Cableway Hoist

THOMAS 150 H. P. ELECTRIC
Special D. D. Scraper Hoist

Also All Types Single, Double, Three-Drum Hoists—Electric, Steam, Gasoline.

THOMAS HOIST COMPANY
20 S. Hoyne Ave. Chicago

Jaw Crushers—2"x4" up to 66"x84".
Crushing Rolls—12"x12" up to 54"x64"—Gyratory Crushers.
Ring Roll Mills — No. 0 and No. 1 — Swing Hammer Mills.
Rotary Fine Crushers—No. 1, No. 1½, No. 2.
Direct Heat Rotary Dryers—4'x30', 5'x30', 5½'x40', 6'x50', and 8½'x25'.
Semi-Indirect Heat Dryers, 4'x30', 4½'x26', 5'x30' and 8½'x75'.
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Hardinge—Marcy & Fuller—Lehigh Mills.
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Complete drying and asphalt mixing plants.
2—8'x72" Hardinge Mills—90% new.
Air Compressors—One No. 27 I-R oil furnace for drills.

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DORCO SAND WASHER

12'-3" inside diameter. Type B3 Serial No. S210.

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FOR SALE — BARGAIN PRICE

SLACK LINE EXCAVATOR

Meade Morrison 2-speed Slack Line Hoist, No. 18358.
125 H. P. Motor, 80' Steel Mast.
2-yd. Dragline Bucket.

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CARS

12-Yd. Western Air, also Hand Dump Cars, Flats, Gondolas, Steel Hopper Cars, Box Cars, Locomotives.

HYMAN-MICHAELS COMPANY
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USED EQUIPMENT

LIQUIDATION BARGAINS

1—No. 5 and 1—No. 6 Allis-Chalmers type K Gyratory Crushers. $500.00 each.
1—No. 8 Allis-Chalmers type K. $1000.00.
1—No. 300 P. & H. Combination Shovel-Crane, ½ cu. yd. $2500.00.
2—14-ton Whitcomb 36" gauge Gasoline Locomotives. $1800.00 each.

All first class, some practically new.

M. WENZEL
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4—750 HP. Busch Sulzer Diesel Units.
15-ton 70-ft. Boom Stiff Leg Derrick.
17-ton Link Belt K-42, 55-ft. Boom Crane.
No. 4 Bonnot 4x22 Tube Mill.
Traylor 6x8 Tube Mill.
750-yd., 1250-yd. and 2000-yd. Asphalt Plants.
2—1¼-yd. Thew Steam Shovels.
2—2-yd. cap. Bucyrus Diesel Draglines.
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Champion 1030 and 1040 Jaw Crushers.
42x36 Allis Chalmers Jaw Crusher.
Pennsylvania SX4, SX6 and SXT12.
368 ft. Chgo. Pneu. Elec. Air Compressor.
150-ton 50-ft. R.R. Track Scale.
3—870-ft. XCB Air Compressors.
Superior 10-in. and 36-in. McCully Crushers.
Traylor 4—10TZ Reduction Crusher.
24x36, 18x36, 13x30 Farrel Jaw Crushers.
3—14-ton Plymouth Gasoline Locomotives.

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Barber-Greene Loader—Serial 25—Model 25A.
Hayward 1-yd. Dragline Bucket.
P & H ½-yd. Crawler Shovel—Model 204—No. 2393.
Single Reversible American Steel & Wire Aerial Tramway, 500 ft. long, automatic control, can be dumped at any point and has storage capacity of 20,000 yds. Is now dumping to storage piles and bins of Transit Mix Co.

This equipment is all in first-class condition and will be sold at a very low figure.

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Polysius Size 14 Zet Crusher
12" x 12" x 10"—50 Tons Per Hour.
Also G. E. 100 H.P. Supersynchronous Motor for Operating Crusher.
This Equipment Has NEVER been used.
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40 H. P. Jones Worm Gear Speed Reducer, base and couplings, ratio 8¾ to one—never used..... 300.00

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2—Allis-Chalmers No. 3 Gyratory Rock Crushers.
2000'—6¼" Threaded and Coupled Casing.
1000'—6" Simplex Prepared Joint C.I. Pipe.
Large Quantity 24" and 32" Steel Riveted Flanged Pipe in 25', 30' and 58' lengths.

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BARGAIN PRICE—STEAM EXCAVATORS
Two Meade Morrison 9"x10" 3-drum Hoisting Engines.
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Two 75' Steel Booms.
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3x6 Double Deck Vibrating Screen.. 295.00
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All of the above in good operating cond.
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Three 24 inch
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COMPLETE PLANT FOR HYDRATING LIME

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USED EQUIPMENT WANTED—SMALL hammer mill crusher belt drive with approximately 4"x12" opening and with ⅛" grate opening to crush limestone. Also small bucket conveyor. Must be in good condition and cheap. Address Box 727, care of Rock Products, 330 South Wells St., Chicago, Ill.

WANTED

194 feet—32-inch, 10 or 11 ply Elevator Belt. In reply state condition, price and location.
Union Limestone Co., Box 526, New Castle, Pa.

WANTED—Several Raymond or Williams roller mills of various sizes to be rebuilt for export. Condition immaterial, but must be cheap for cash. Describe fully. Address
Box 696 care of Rock Products
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WANTED

In perfect condition, one diesel-driven air compressor, self-contained, two-stage, capacity 1,000 feet per minute, location and price.
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Representatives wanted to sell on commission basis a high grade wire cloth used extensively in sand, gravel, stone, coke plants, cement mills, etc. Address Box 707, care of Rock Products, 330 S. Wells Street, Chicago, Ill.

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QUARRY FOREMAN—HAVE PERMANENT position for sober, industrious man with practical experience and ability to take charge of small limestone quarry employing twelve to twenty men. Only those able to show production at minimum cost will be considered. Will be necessary to keep air compressor, gas locomotives and all equipment in repair and in operating condition. Southern territory. Address Box 726, care of Rock Products, 330 South Wells St., Chicago, Ill.

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POSITIONS WANTED

POSITION WANTED — PURCHASING Agent. Not a college graduate. Have fifteen years' experience buying for large quarries and mills. Now employed as P. A. but desire change for good reasons. Address Box 723, care of Rock Products, 330 South Wells St., Chicago, Ill.

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SUPERINTENDENT WHO HAS DEMONstrated exceptional ability in all phases of Sand and Gravel Plant operation is now available. He is 40 years of age and has 15 years' experience in the construction and operation of sand and gravel plants producing up to two million tons annually. He can furnish excellent references as to character and ability, is capable of handling any problem concerning sand and gravel production and is now looking for a permanent connection with a company to whom his past experience will be an asset. Address Box 714, care of Rock Products, 330 South Wells St., Chicago, Ill.

POSITION WANTED AS SUPT. WITH A progressive stone company; 20 years' experience operating limestone quarries and crushing plants; familiar with all modern equipment, efficient handling of labor with record of low cost of production; qualified to assume full charge of any size plant or plants; unquestionable references. Open for engagement. Address Box 654, care of Rock Products, 330 South Wells St. Chicago, Ill.

POSITION WANTED AS QUARRY FOREman with cement plant or crushing plant. 25 years' experience operating limestone quarries. Familiar with all modern equipment. Efficient handling of labor and low cost of production. I am expert in the handling of explosives and drilling. Qualified to handle any size plant, unquestionable reference. Address Box 712, care of Rock Products, 330 S. Wells Street, Chicago, Ill.

POSITION WANTED—FIRST-CLASS MAN, 20 years' experience erecting and operating lime and crushing plants, quarrying all kinds of stone; capable of taking full charge any proposition; moderate salary; would purchase an interest in a good business prospect, when money agreeable; location anywhere. Address Box 728, care of Rock Products, 330 S. Wells St., Chicago, Ill.

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